promarine

INTERFERENCE-FREE COMMUNICATION

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INTERFERENCE-FREE COMMUNICATIONS

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The concept of interference-free communication

Promarine Ltd, a Finnish manufacturer of innovative communication systems, has developed a unique solution for maritime communications. The solution solves the problem of interference in communication.

The demands on both voice and data communications in the maritime industry has increased rapidly during last years. The complexity of communication systems has, however, raised problems like interference, intermodulation, corrosion and ground leaks. The problems are difficult to find and overcome, but are crucial to solve in order to secure the safety of crew, passengers and vessel.

The Promarine solution for interference-free communication relieves the burden of communication system design from the shipyards. It ensures performance and maintenance-free years for ship owners and operators. It also helps system integrators and engineers to avoid and cure problems arising in existing fleets. The concept is compatible with all radio manufacturers, all existing communication systems and thus immediately available for the maritime industry. It brings direct cost savings and removes performance issues.

The Promarine solution for interference-free communication includes comprehensive service and product portfolio. The service offering includes both on-site and back office analysis, consultancy, design and measurement, troubleshooting and verification services. The product offering covers antennas, galvanical antenna isolators, antenna combiners, signal splitters, ATEX attenuators and grounding protectors.

proTAC 5110 FM and DAB antenna

HIGHLIGHTS

- Combined FM and DAB (digital audio broadcast) active receive antenna.
  It covers 80-108MHz FM Broadcast and 170-240MHz Band 3 DAB broadcast
- easy to use 4-bolt flange mount
- does not require ground plane – mast installation possible
- extremely robust

DESCRIPTION

proTAC 5110 is designed to cover all FM and terrestrial DAB frequencies.

Digital audio broadcasting (DAB) is a digital radio technology for broadcasting radio stations, used in several countries across Europe and Asia Pacific. In some countries it is going to replace old FM broadcast frequencies.

Antenna is based on the Promarine's compact and robust design. It is designed to be used together with proFIL 1314 active antenna power feed.

TECHNICAL SPECIFICATIONS

Model:	proTAC 5110	**Mounting**:	140mm 4-bolt flange mount M10, 1115mm DCD
Type:	Active FM and DAB receive antenna	**Environmental:**	outside
Size (h*l*w):	radome: 250mm (h) 90mm (w) mounting plate: 140mm(w) weight: 0.9kg	**Frequency range:**	80MHz – 240MHz RL: < -5dB Amplifier gain: 16 dB
Material:	Plastic cover, aluminum mounting plate	**Options:**	-proFIL1314 FM/DAB antenna power feed -mounting options
Radiation performance:	N/A	**Connectors**	N-female

(Specification can change without notice)echnical specificationstically.

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proTAC™ 5311

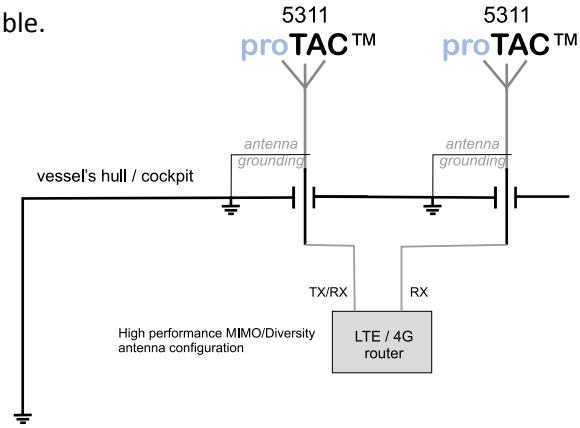
wireless GSM/4G/5G/WLAN communication antenna

Space quality and military performance in compact and robust package for affordable price – innovative communications antenna for 4G data routers and voice communication systems.

Covers all 2G, 3G and 4G frequencies used worldwide and is 5G compatible.
(GSM, GPRS, DCS, UMTS, WCDMA, LTE, WLAN...)

Only proTAC™ can offer you these benefits

- Huge cost savings in satellite based data
- 4 antennas in one with 5dBi gain - without compromises
- longer range than standard antennas > 35km
- provides stable connection – good for critical ERP and VPN systems
- replaces existing antennas
- lightning and ESD protected
- works in all continents – in every network



Frequency range: 800MHz – 2.6GHz
(extended range from 600MHz to 6GHz)
Gain: upto 5dBi
RF Power: 250W
Grounding: DC-grounded
Connector: N-type (female at bottom)

Proposed installations:
proISO™ series galvanic isolators can be used to prevent ground leaks and loops

Frequency range		
Frequency / band	VSWR with ground plane	VSWR without ground plane
Wideband	< 2.0 (460MHz – 6GHz)	< 2.0 (680MHz – 6GHz)
800MHz LTE	< 1,5	< 1,8
900MHz GSM/LTE	< 1,4	< 1,6
1800MHz DCS/LTE	< 1,5	< 1,3
1900MHz PCS/LTE	< 1,3	< 1,2
2100MHz 3G/WCDMA	< 1,4	< 1,2
2400MHz WLAN	< 1,5	< 1,3
2600MHz LTE	< 1,4	< 1,5
5850MHz WLAN	< 1,5	< 1,5
(ground plane used in measurements 1 m²)		

Powerhandling
Continuous total 250W

Mounting
proTAC™ 4-bolt flange mount
O-ring supplied for sealing
optional flange mount to BSP1”-11TPI standard mount adaptor

Environmental
Case IP68 shock proof
Operating temp: -30° - +60°

Material
Anodized Aluminium base (electrically conducting)
Radome moulded plastic (ASA)

Dimensions
Height: 120mm (with connector)
Width: 90/140mm (radome/base plate)
Weight: 600g

ORDER CODE ANT5311:
proTAC 5311 Wireless GSM/4G/WLAN communications antenna

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proTAC™ 5315

Wideband LTE and TETRA antenna

HIGHLIGHTS

- Extended version of proven 4G LTE antenna proTAC 5311. It seamlessly covers the range 380MHz – 3GHz without compromises in performance
- Easy to use 4-bolt flange mount
- Does not require ground plane – mast installation possible
- Extremely robust

DESCRIPTION

proTAC 5315 is designed to cover all LTE frequencies thus being an ideal solution for any LTE modem worldwide.

It is based on the Promarine's leading design that brings 20-70% radiation efficiency advantage compared to industry standard antennas. This can be directly seen as improved data rate and range even in severe conditions.

Technical specifications			
Model:	proTAC 5315	Mounting:	140 mm 4-bolt flange mount M10, 1115 mm DCD
Type:	High performance wideband LTE antenna	Environmental:	outside
Size (h*l*w):	radome: 250 mm (h)	Frequency range:	380 MHz – 3 GHz
	90mm (w)		RL: < -15 dB
	mounting plate:		Gain: Unity gain
	140 mm(w)		VSWR <2.0 (avg)
	weight: 0.9 kg		
Material:	Plastic cover, aluminum mounting plate	Options:	mounting options for 1" thread mount or vertical/horizontal pipe
Connectors:			N-female

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proANT™ 5331

MIMO antenna module for 4G routers

HIGHLIGHTS

- Factory configurable MIMO antenna module
- upto 2x2 MiMo for LTE, 3G Diversity
- upto 2x2 MiMo for 2.4GHz WiFi
- active GPS antenna

DESCRIPTION

proANT™ 5330 series compact high performance 4G router antenna module allows OEMs and system integrators to easily deploy Internet access to transport industry in volumes greater than 10pcs.

It's primary LTE antenna module is based on the Promarine's leading design that brings 20-70% radiation efficiency advantage compared to industry standard antennas. Remaining antenna modules can be chosen by OEM.

TECHNICAL SPECIFICATIONS

Model:	proANT 5331	**Mounting**: OPTION A: 2x M4 screws or BSP1"-11TPI external thread OPTION B: BSP1"-11TPI internal thread antenna mount	
Type:	MIMO antenna module	**Environmental:**	indoors, outdoor
Factory options: antenna modules		**Frequency**	
Main LTE antenna	☒	790M-2700MHz	
AUX LTE antenna	☐	890-2600MHz	
WiFi Main antenna	☐	2400/5800MHz	
WiFi AUX antenna	☐	2400/5800MHz	
GPS antenna(+5VDC)	☐	1575,42/1610MHz	
Material: Plastic cover (ASA) stainless steel mounting plate		**Cables:** RG316	
Primary antenna: vertical polarization, omnidirectional antenna gain 0-5dBi		**Size (h*l*w):** 155x140x105mm without mounting thread height with BSP1"-11TPI mounting thread +35mm	

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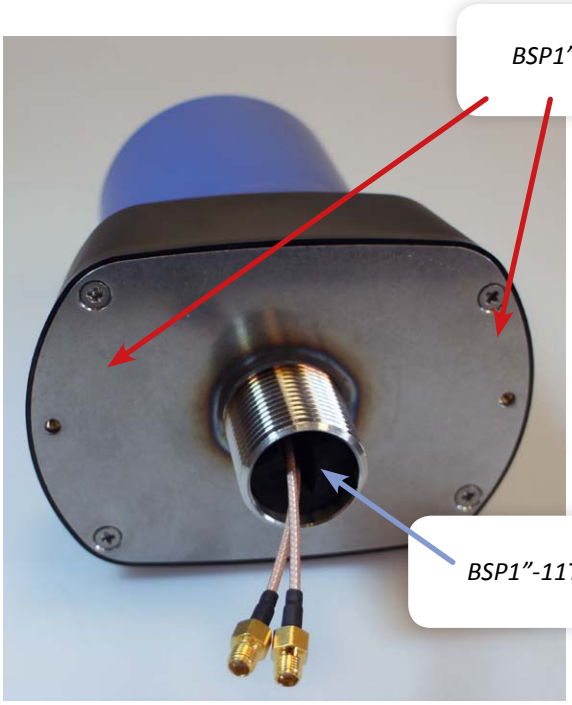
proANT™ 5331

MIMO antenna module for 4G routers



Mounting A

Mounting B

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proD4™

Multifrequency antenna

Multiuse – multi frequency antenna for everyday communications

proD4™ is an highly integrated multifrequency antenna that covers the most of communication frequencies and it performs!. It is used in normal leisure boats and why not in professional work- and patrol boats as well.

Overview

proD4™ – multi frequency antenna covers all everyday communication needs for leisure boat. It's leading design principle was to maximize signal to noise ratio and signal quality instead of reaching the maximum gain at the cost of quality.

proD4™ utilizes also the state of the art design rules that are normally not seen in consumer electronics. It is perfect for sailing boats and marine environments where signals are strongly reflected from the wave surface. In addition to FM, TV, WLAN and GPS it covers all GSM, 3G and LTE bands.

Operation

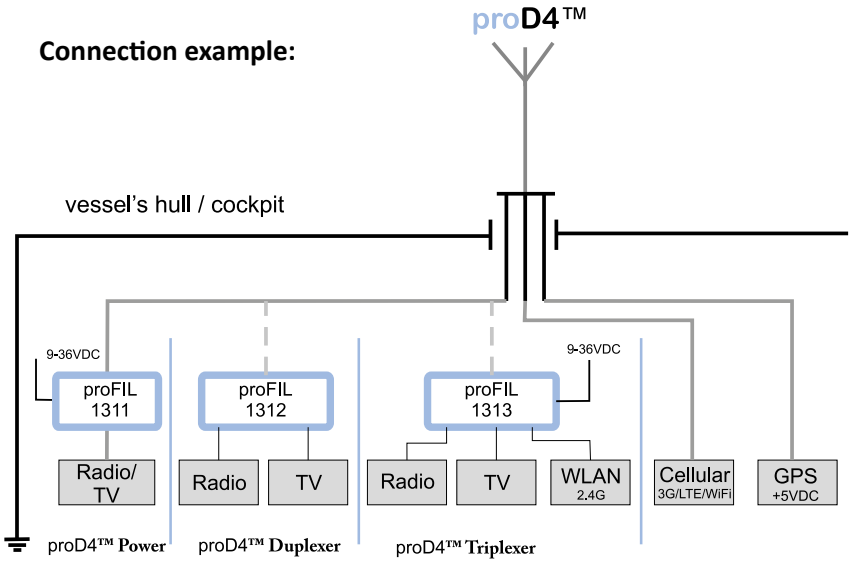
It's operating frequencies are arranged into three groups (FM/TV/WLAN, GSM/4G/WLAN, GPS) each fed with separate cable to make its usage easier. It can be further coupled with special splitter that provides necessary operating power to the antenna (specially GPS and FM/TV amplifier).

The TV antenna of proD4™ is amplified and filtered. Filtering is done separately for TV VHF and TV UHF bands in order to maximise its performance and avoid interference caused by AIS, VHF, 450MHz data radios and GSM radios. The used amplifier is a state of the art design closely integrated with the antenna element thus minimizing the required gain (too big gain amplifies interference and reduces signal quality). This way the overall signal quality is superior to the other antennas.

It does them all

- FM radio
- DAB (digital audio broadcast)
- DVB / DVB-T / DVB-T2
- PAL, NTSC, SECAM
- GSM800, GSM900, GSM1800, GSM1900, 3G800/2150, 4G/LTE
- WLAN2.4
- GPS/GLONASS/GALILEO

Connection example:



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INTERFERENCE-FREE COMMUNICATIONS

proD4™

Multifrequency antenna

Electrical Specifications (TA=25°C)	
Antenna properties	
Frequency/ relative gain	FM Radio: 80-108MHz / > 8dBi TV(VHF): 170-240MHz / > 14dBi TV(UHF): 480-800MHz / > 18dBi GSM:800-960MHz / > 2dBi GSM:1700-2150MHz / > 2dBi WLAN: 2.4GHz / >2dBi GPS: 1575-1610MHz / 28dBi
Power supply	Active GPS antenna +5VDC/25mA
	FM/TV antenna amplifier +5VDC/<300mA
Connectors	FM/TV/WLAN: BNC – female GSM/LTE: TNC – female GPS: TNC-male
Resistance to ground	Floating

Mechanical and Environmental properties (TA=25°C)	
Dimensions	height: 160 mm diameter: 370 mm
Weight	2000 g
Material	Plastic body (ASA)
Mounting	Standard BSP1" - 11TPI mount with inner thread
Ingress protection	IPx5
Operational environment continuous	20° - +30° C (short term -40° - +55°)
ORDER CODE	PROD401
ACCESSORIES	FIL1311 – proD4 Power Feeder FIL1312 – proD4 Duplexer FIL1313 – proD4 Triplexer ACCANT1002 – optional mounting BSP1" - 11TPI (outer) to 1" - 14TPI (inner) thread adaptor CABLEKIT 1 - 3x 7m low loss cables with connectors CABLEKIT 2 - 3x 10m low loss cables with connectors CABLEKIT 3 - 3x 15m low loss cables with connectors
Standards	All proFIL™ products are to the standard of IEC60945 to insure safe operation in the environment on relevant parts. Some of the criteria is operating temperature, storage temperature, humidity, vibration, electromagnetical compatibility.

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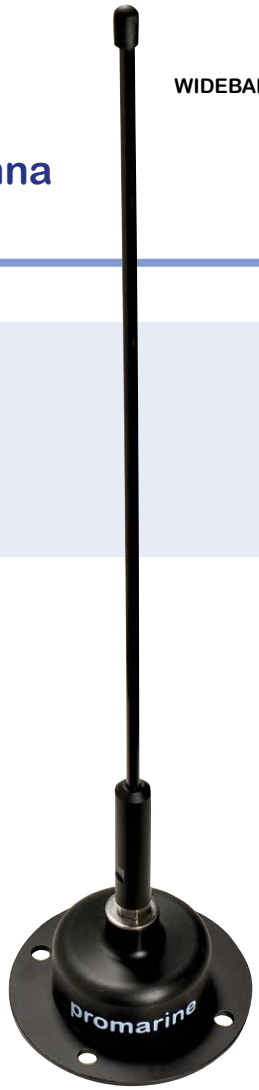
INTERFERENCE-FREE COMMUNICATIONS

proTAC 5020
Wideband VHF Communications Antenna
(AIR VHF and Marine VHF)

proTAC 5020 compact and robust wideband VHF communications antenna for Search and Rescue and patrol boats is designed for demanding marine and military conditions.



proTAC 5020 wideband VHF communications antenna is a unique combination of aviation VHF and marine VHF frequencies. It covers the whole spectrum between 110-170MHz with good performance.

High performance and robust proTAC™ technology reduces design complexity of vessels' topside structures by radically minimizing the antenna count. It not only makes the design easier but it also reduces intermodulation interference and cross-talk that would otherwise occur in too densely located antenna environments.

Used together with Aviation VHF and Marine VHF Antenna Combiner -proFIL 4010 it is possible to use simultaneously up to two radios.

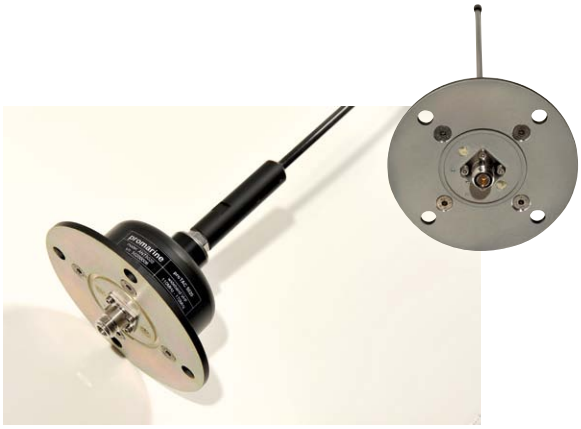
proTAC™ technology combines unique design and materials that minimize radar cross section, increases robustness and reduces interference while being compact in size.

Advanced features create advantage

- less interference
- requires ground plane
- compatible NATO-flange mount
- very compact and robust design
- aluminum and nylon body, replaceable carbon fibre whip
- designed to be used with proFIL 4010 and two radios
- can be used with proISO 1001 to prevent ground loops

Electromagnetic modelling services fine-tunes performance

Use our advanced proEMS™ electromagnetical simulation, modelling, analysis and measurement services to create a complete 3D-electromagnetic environment of the ships' external structures. This way the optimum location for each antenna with the least interference can be found and verified. The proEMS™ services are useful for any size of boat or ship and will be tailored for each customer separately.



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Wideband VHF Communications Antenna
(AIR VHF and Marine VHF)

Technical features

Antenna type:
Omnidirectional
Operational mode is monopole
Adequate ground plane and contact is required (>1 sqm)

Frequency range:
AIR: 118MHz - 137MHz
VHF: 150MHz - 170MHz
WIDE: 110MHz - 170 MHz

Antenna gain:
AIR: 1dBi
VHF: 1dBi

Return loss:
AIR: >10dB (max. 17dB)
VHF: >10dB (max. 15dB)
WIDE: >10dB

Powerhandling:
Continuous total 50W

Mounting:
NATO-flange mount with four bolts
O-ring supplied for sealing

Connector:
N-type female at bottom

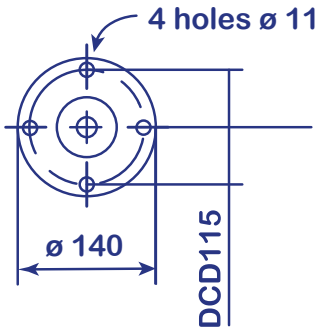
Enviromental:
Case IP68 shock proof
Operating temp: -30° - +60°

Material:
Aluminium base
Carbon fibre radiator whip

Dimensions:
Height: 610 mm (without connector)
Width: 140 mm (base plate diameter)
Weight: 625 g

Order code:
ANT5020:
proTAC 5020 Wideband VHF Communications Antenna

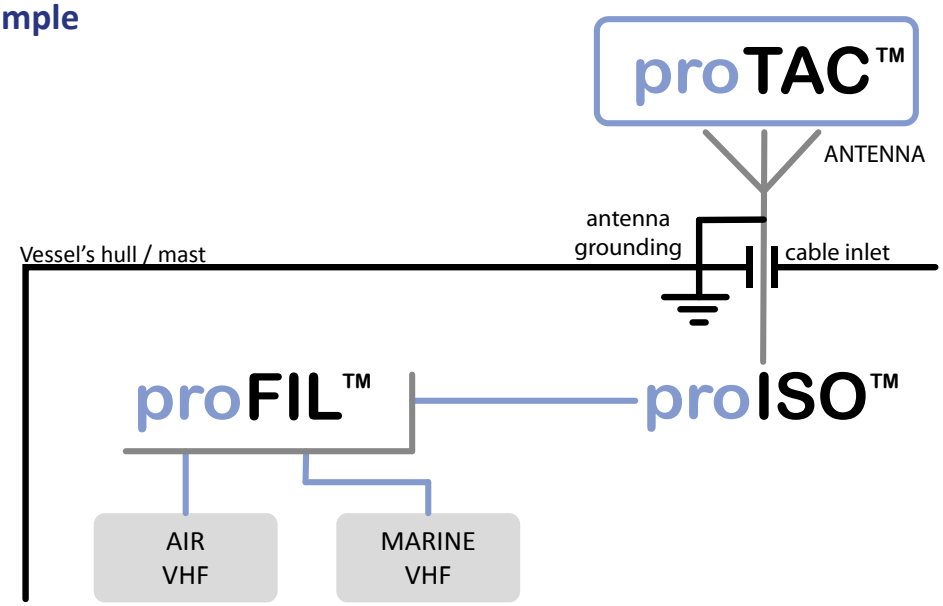
Delivery time:
From stock (with reservations)



Dimensions:
Height: 610 mm

Width: 140 mm

Connection example



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proTAC 5401
4-band Communications Antenna
(FM – VHF – TETRA – UHF)

proTAC 5401 compact and robust 4-band communications antenna for patrol boats is designed for demanding marine and military conditions.

proTAC 5401 4-band communications antenna offers good match for FM receiver, Marine VHF, TETRA and 450MHz UHF LTE/WiMAX bands. Alternatively 450 MHz band can be used with TETRA TEDS radios.

High performance and robust proTAC™ technology reduces design complexity of vessels topside structures by radically minimizing the antenna count. It not only makes the design easier but it also reduces intermodulation interference and cross-talk that would otherwise occur in too densely located antenna environments.

Used together with Quadruplex Antenna Combiner-proFIL 4401 it is possible to use simultaneously up to four radios.

proTAC™ technology combines unique design and materials that minimize radar cross section increases robustness and reduces interference while being compact in size.

Advanced features create advantage

- less interference
- requires ground plane
- compatible NATO-flange mount
- very compact and robust design
- aluminum and nylon body, replaceable carbon fibre whip
- designed to be used with proFIL 4401 and four radios
- can be used with proISO 1001 to prevent ground loops

Electromagnetic modelling services fine-tunes performance

Use our advanced proEMS™ electromagnetical simulation, modelling, analysis and measurement services to create a complete 3D-electromagnetic environment of the ships' external structures. This way the optimum location for each antenna with the least interference can be found and verified. The proEMS™ services are useful for any size of boat or ship and will be tailored for each customer separately.

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4-band Communications Antenna
(FM – VHF – TETRA – UHF)

Technical features

Antenna type:
Omnidirectional
Operational mode is monopole
Adequate ground plane and contact is required

Frequency range:
FM: 88MHz - 108MHz
VHF: 150MHz - 170MHz
TETRA: 380MHz - 420MHz
UHF: 450MHz - 470MHz

Antenna gain:
FM: -5dBi
VHF: 1dBi
TETRA: 2dBi
UHF: 1dBi

Return loss:
FM: >6dB
VHF: >10dB
TETRA: >10dB
UHF: >10dB

Powerhandling:
Continuous total 50W

Mounting:
NATO-flange mount with four bolts
O-ring supplied for sealing

Connector:
N-type female at bottom

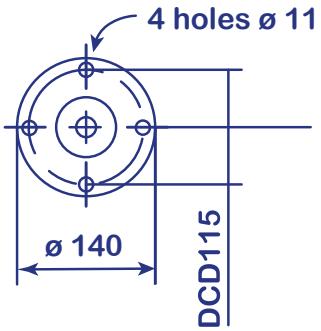
Enviromental:
Case IP68 shock proof
Operating temp: -30° - +60°

Material:
Aluminium base
Carbon fibre radiator whip

Dimensions:
Height: 400 mm (without connector)
Width: 140 mm (base plate)
Weight: 620 g

Order code:
ANT5401:
proTAC 5401 4-Band Communications Antenna (FM – VHF – TETRA – UHF)

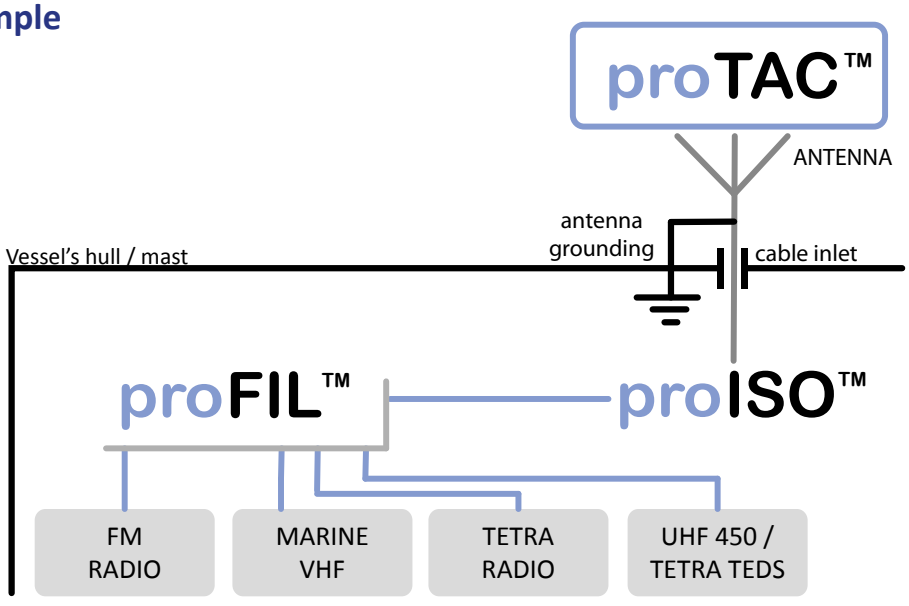
Delivery time:
From stock (with reservations)



Dimensions:
Height: 400 mm

Width: 140 mm

Connection example



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DSC Antenna Splitters and power supplies

proFIL™ series of Professional Antenna splitters and power supplies is an alternative to speed up new receiver installations and save topside space with reduced number of antennas. Alternatively you can change your existing antenna power supply with our galvanic isolated low noise design for better performance.

proFIL 1320 MF/HF DSC and Navtex antenna power supply with completely isolated +9V feed to antenna.

proFIL 1321 Passive MF/HF antenna splitter for DSC and Navtex receivers.

proFIL 1322 Active Navtex antenna splitter for Navtex and DSC with isolated power supply for antenna.

proFIL 1323 FM antenna splitter for FM receiver and Navtex receiver with low noise Navtex amplifier.

proFIL 1314 Power supply for active FM/DAB antenna.

proFIL 4202 VHF antenna splitter for AIS and DSC receivers.

Connection example

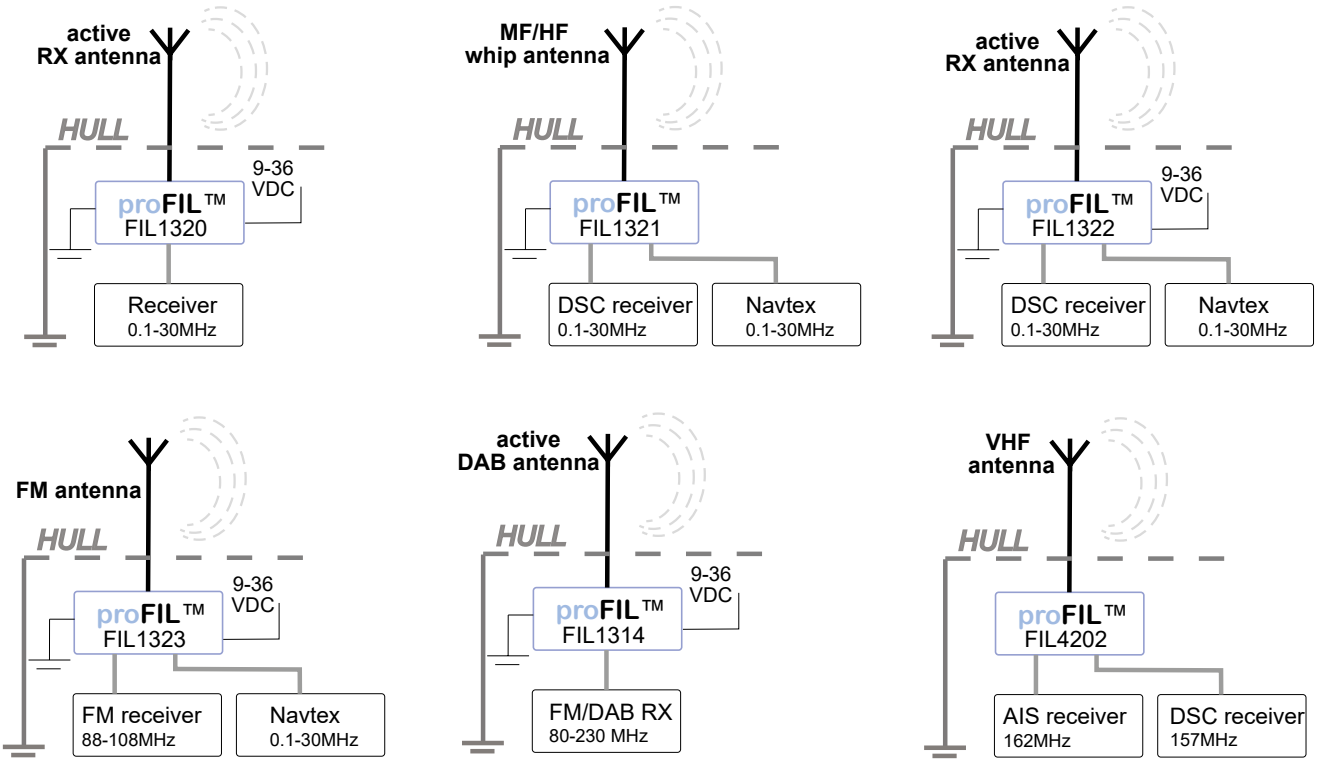

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Table 1
Electrical Specifications

Electrical specifications (T_A=25°C)	proFIL 1320 (FIL1320)	proFIL 1321 (FIL1321)	proFIL 1322 (FIL1322)	proFIL 1323 FIL1323)	proFIL 1314 (FIl1314)	proFIL 4202 (FIL4202)
Antenna port	0.1MHz-30MHz	0.1MHz– 30MHz	0.1MHz– 30MHz	0.1MHz– 30MHz	80MHz – 230MHz	100MHz - 300MHz
Receiver ports (receiver only max. allowed power 0.1W)	**RX 1:** 0.1MHz- 30MHz (isolated from body)	**Navtex** : 0.1MHz – 30MHz RL: > 18dB **DSC**: 0.1MHz – 30MHz RL: > 18dB	**RX 1:** 0.1MHz-30MHz (isolated from body) **RX 2:** 0.1MHz-30MHz (isolated from body)	**RX 1 (Navtex):** 0.1MHz- 4MHz (DC power feed through, 50ohm) **RX 2 (FM):** 80- 108MHz (75ohm)	**RX 1:** 80MHz-230MHz	**DSC:** 156.525 MHz RL: > 16dB **AIS:** 161-163 MHz RL: >16dB
Attenuation	< 0,3 dB	< 3.5 dB	< 3.5 dB	RX1: +17 dB RX2: -4 dB	< 4.0 dB	< 4.0 dB
Port Isolation (between receivers)	-	> 17 dB	> 17 dB	> 17 dB	-	> 20 dB
Port impedance	50ohm	50ohm	50ohm	50/75ohm	50ohm	50ohm
Connectors	N-female	N-female	UHF-female	Navtex: N-female FM/ANT: BNC female	BNC-female	BNC-female
Resistance to ground	Antenna and RX port isolated from the case, Lightning protection	Body grounded with coax shields, antenna port shield and radio port shields in common potential	All ports isolated from the ground and body	FM radio port shield connected to case, ANT and Navtex ports isolated	ANT-port shield connected to case, RX port isolated	Body grounded with coax shields, antenna port shield and radio port shields in common potential
DC power	**input:** 9-36V **output:** 12V, 100mA isolated supply	-	**input:** 9-36V **output**: 12V, 100mA isolated supply	**input**: RX1 DC-feedthrough to output	**input**: 9-36V **output**: 5V,500mA	-

Table 2
Mechanical and Environmental properties

Mechanical and Environmental properties (TA=25°C)	proFIL 1320 (FIL1320)	proFIL 1321 (FIL1321)	proFIL 1322 (FIL1322)	proFIL 1323 FIL1323)	proFIL 1314 (FIl1314)	proFIL 4202 (FIL4202)
Dimensions	height: 30 mm width: 119 mm depth: 110 mm					
Weight	about 320 g					
Material	aluminum body					
Mounting	wall mounting flanges with M4 holes					
Ingress protection	none					
Operational environment	-30° - +60° C					
Standards	All proFIL™ products are to the standard of IEC60945 to insure safe operation in the environment on relevant parts. Some of the criteria is operating temperature, storage temperature, humidity, vibration, electromagnetical compatibility. Body grounded with coax shields, antenna port shield and radio port shields in common potential					

FM-VHF-TETRA-450 Quadruplex Antenna Combiner

proFIL 4401 Quadruplex Antenna Combiner is a unique solution to reduce vessels' total antenna count and to increase total effectiveness of communication.

proFIL 4401 Quadruplex antenna combiner is specially designed for newbuildings to ease antenna planning for naval architects. The solution solves many severe problems that can exist in small patrol boats.

High performance proFIL™ technology enables modern communications without compromising safety and performance. Its low loss and high isolation output ports improves the overall performance of the communication system in comparison to the traditional one antenna – one radio approach.

proFIL 4401 combines four radios: FM receiver, marine VHF, TETRA and 450MHz UHF band into same antenna when using it together with tactical proTAC 5401 Quad Band antenna. UHF band can be used either for 450MHz LTE/WiMAX radio that is widely available in Europe or for TETRA TEDS extension.

proFIL™ technology is proven and used by many governments and authorities in Europe. High redundancy requirements can be met by using proFIL 4401 in dual combiner set-up.

Save space, simplify structures

- reduces antenna count from 4 to 1
- high isolation outputs
- compact and robust design
- designed to be used with proTAC 5401 tactical antenna
- can be used with proISO 1001 to prevent ground loops

Electromagnetic modelling services fine-tunes performance

Use our advanced proEMS™ electromagnetical simulation, modelling, analysis and measurement services to create a complete 3D-electromagnetic environment of the ships' external structures. This way the optimum location for each antenna with the least interference can be found and verified. The proEMS™ services are useful for any size of boat or ship and will be tailored for each customer separately.

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FM-VHF-TETRA-450 Quadruplex Antenna Combiner

Technical features

Filter type:
High isolation quadruplex filter

RF performance:
FM: 88MHz - 108MHz
(RL: >13dB @50Ω, Loss: <1.0dB)
VHF: 150MHz - 170MHz
(RL: >17dB, Loss: <1.0dB)
TETRA: 380MHz - 420MHz
(RL: >17dB, Loss: <0.9dB)
UHF: 450MHz - 470MHz
(RL: >13dB, Loss: <1.1dB)
ANT: 88MHz - 470MHz
(50Ω)

Powerhandling:
Continuous total 100W

Mounting:
Suitable for 19" rack mounting
M4 threads

Connectors:
N-type female at each port

Environmental:
Operating temp: -30° - +60°
Non condensing

Material:
Painted aluminium

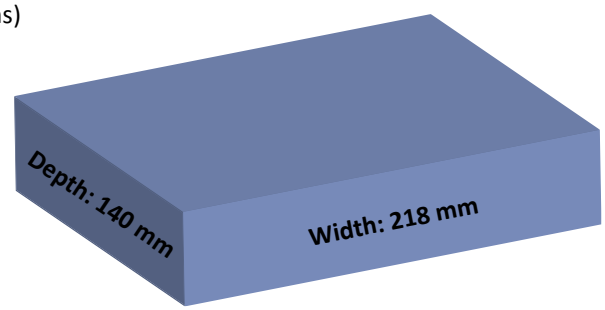
Power supply:
No external power required

Dimensions:
Height: 43 mm (1U)
Width: 218 mm
Depth: 140 mm
Weight: 800 g

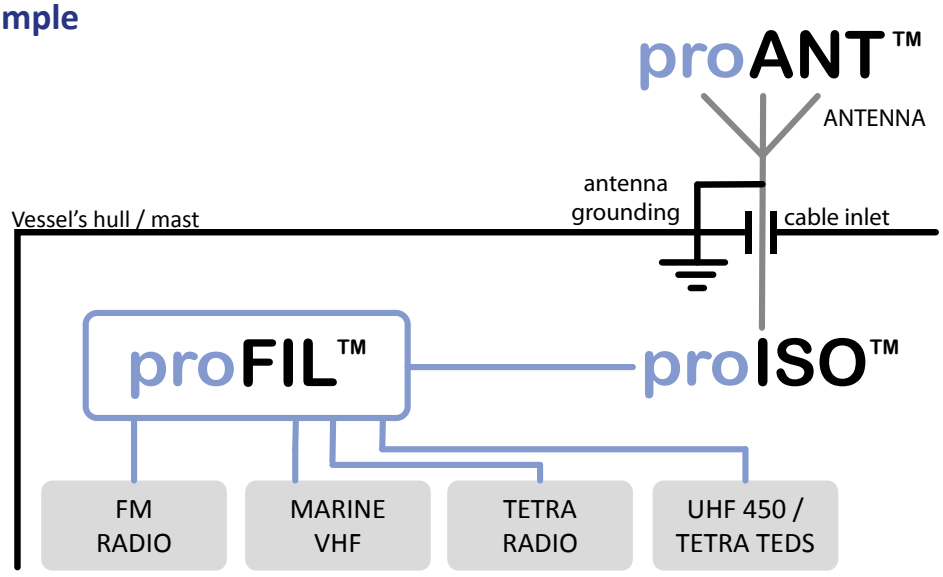
Order code:
FIL4401: proFIL 4401 FM-VHF-TETRA-450 Quadruplex Antenna Combiner

Delivery time:
From stock (with reservations)

Dimensions:
Height: 43 mm



Connection example



LTE and WiFi antenna combiners

Compact and high performance diplex type antenna combiners reduces cabling work and the amount of antennas. They are intended for dense LTE and WiFi setups specially MIMO transceiver deployments.

proFIL 5220 covers communication bands from 80MHz up to 6GHz.
LTE communication port is specially designed for modern high speed data modems operating between 690MHz and 2.7GHz. WiFi port is intended for WLAN routers at 5.8GHz(4-6GHz).
It is ideally used with proTAC 5311 antenna.

proFIL 5230 is a compact and high performance antenna combiner from 300 MHz up to 6GHz WiFi frequency.
It is ideally used with proTAC™ 5315 Wideband LTE antenna to split it with 380 MHz Tetra or 450MHz LTE modem and 4G LTE Modem.

Operation

proFIL antenna combiners are completely passive with no wearing or serviceable parts. Thus maximizing the reliability. They all features high RF-isolation between radio ports and steep band pass characteristics towards antenna thus minimizing the risk for spurious transmissions.

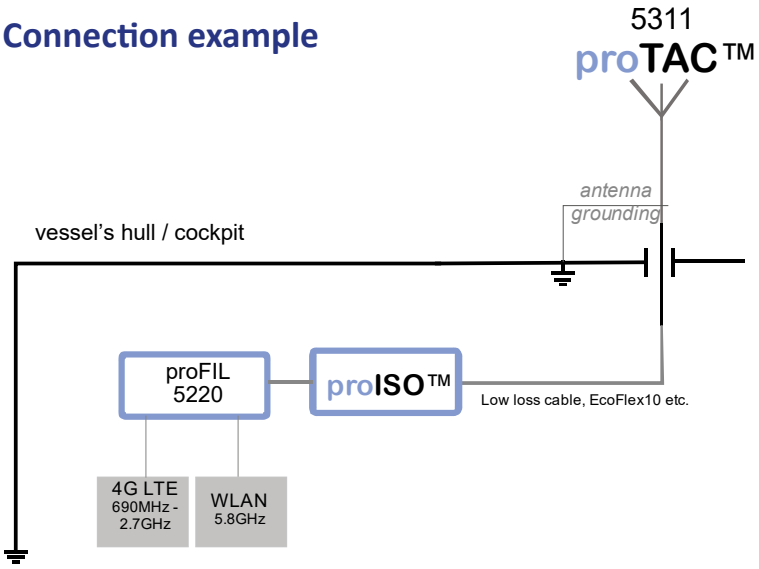
Diplex–type of filters enables simultaneous transmission and reception within the same radio port. They also enable simultaneous transmission or reception in adjacent ports if specified for transmitters.

As they are frequency division combiners, they don't create any extra splitting losses except the normal insertion loss that can be compared to small length of an antenna cable.

Instant advantages

- reduced co-site interference
- reduced intermodulation
- saved space
- reduced installation cost and time

Connection example



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LTE and WiFi antenna combiner

Electrical Specifications (T_A=25°C)	proFIL 5220 (FIL5220)	proFIL 5230 (FIL5230)	proISO 1010 GLI1010
Antenna Port	10MHz – 6GHz (low loss cable recommended)	300 MHz – 6 GHz (low loss cable recommended)	1GHz – 6GHz
Radio Ports	**LTE: 10-2700MHz** **RL: < -20 dB** **Insertion loss: < 0.7 dB (avg)** **WLAN: 4 GHz – 6 GHz** **RL: < -20 dB** **Insertion loss: < 0.7 dB (avg)**	**LTE Low: 300 MHz – 490 MHz** **RL: < -10 dB** **Insertion loss: < 2.0 dB** **LTE High: 690 MHz – 3 GHz** **RL: < - 10dB** **Insertion loss: < 2.0dB**	**RL: < -25 dB** **Loss: < 0.7 dB**
Power Handling (max simultaneous)	2 W	5 W	50W
Port Isolation (between outputs)	> 30 dB	> 30 dB	-
Port impedance	50ohm	50ohm	50ohm
Connectors	N-female	TNC-female	N-female
Resistance to ground	connector shield connected to case ground	connector shield connected to case ground	connector shields isolated from each other, antenna port shield is connected to case

Mechanical Specifications (T_A=25°C)	proFIL 5220 (FIL5220)	proFIL 5230 (FIL5230)	proISO 1010 (GLI1010)
Dimensions	height: 30mm width: 119mm depth: 110mm		42x42mm (w&h) 130mm (L)
Weight	about 320g		200g
Material	Aluminum body		
Environment	-20°C – 40°C, no ingress protection		-30°C – 60°Cnon condensing IP65
Mounting	wall mounting flanges with M4 holes integrated		hanging, cable rail din rail/wall mounting options available
Standards	All proFIL™ and proISO™ products are to the standard of IEC60945 to insure safe operation in the environment on relevant parts. Some of the criteria is operating temperature, storage temperature, humidity, vibration, electromagnetical compatibility.		

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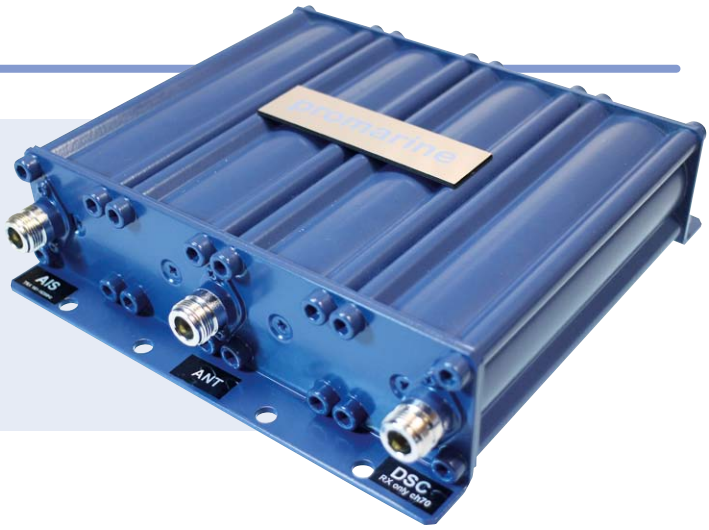
VHF Antenna Combiners

VHF Antenna Combiners are high performance duplex and diplex type antenna combiners that enables the simultaneous use of marine VHF antenna with two transmit or receive radios. They tolerate high transmission powers while protecting radios with high isolation.



proFIL4201

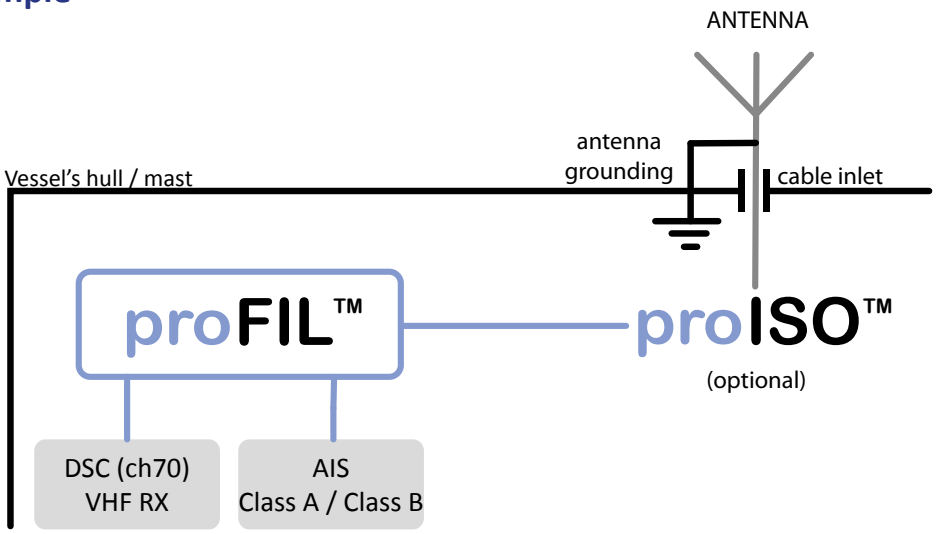
High-performance proFIL™ technology in proFIL 4201 combines separate VHF DSC (ch70 digital selective call) receiver antenna and AIS (automatic identification system) transceiver antenna into the same antenna without compromising safety and performance. By using a common VHF antenna for both AIS transceiver and DSC receiver, cabling is reduced and less space is occupied at ship's topside. Installation of AIS equipment can be instantaneous.

Compared to IMO recommendations, high isolation proFIL™ technology separates two radios virtually by over 200 meters instead of recommended 5 meters. Its low loss technology on all ports does not disturb the sensitivity of the communication equipment.

proFIL 4230

When there is no more space for new antennas or cabling is too big effort like in sailing yacht masts the proFIL 4230 splits transmitting VHF antenna for FM receiver. Depending on the wideband performance of the used VHF antenna and cable installation, the FM reception performance can be good.

Connection example



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VHF Antenna Combiners

Electrical specifications (T_A=25°C)	proFIL 4201 (FIL4201)	proFIL 4230 (FIL4230)
Antenna port	155- 163MHz	80MHz– 170MHz
Radio ports	**AIS:** 161-163 MHz RL: >20 dB Power: 100W **DSC ch70:** 156.525MHz RL: > 20 dB	**FM**: 80MHz – 108MHz RL: > 20dB **VHF TRX**: 150MHz – 170MHz RL: > 20dB
Attenuation	< 1,0 dB	< 0.5 dB
Port Isolation (between receivers)	> 60 dB	> 35 dB
Port impedance	50ohm	FM: 75ohm VHF: 50ohm
Connectors	N-female	N-female
Resistance to ground	Connector shields share the chassis ground	Body grounded with coax shields, antenna port shield and radio port shields in common potential

Mechanical Specifications (T_A=25°C)	proFIL 4201 (FIL4201)	proFIL 4230 (FIL4230)
Dimensions	height: 50mm width: 200mm depth: 184mm	150x150mm (w&l) 60mm(h)
Weight	1230g	600g
Material	Aluminum body	
Environment	-30°C – 60°C, no ingress protection, non condensing	-30°C – 60°C no ingress protection
Mounting	wall mounting flanges integrated	
Standards	All proFIL™ and proISO™ products are to the standard of IEC60945 to insure safe operation in the environment on relevant parts. Some of the criteria is operating temperature, storage temperature, humidity, vibration, electromagnetical compatibility.	

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proISO™ series of Galvanical Coaxial Cable Isolators

proISO™ series of Galvanic Coaxial Cable Isolators for DC-grounded antennas solves immediately ground leak and interference problems in communication system. proISO™ technology is designed especially for demanding marine and military environments.

proISO™ series of Galvanic Coaxial Cable Isolators allows the use of ground plane-, lightning protected- and grounded antennas in vessels that would otherwise suffer from stray currents and ground leaks. proISO ™ series protects against conducted noise and interference. In addition to universal isolator, proISO™ series includes optimized models for FM radio and TV antennas, high power MF/HF systems and marine VHF.

Due to high-performance design of proISO™ it can easily be used between antennas, filters, radios and amplifiers without losing sensitivity of the communication system.

proISO™ technology enables trouble free EMP and EMC protection of coaxial cable inlets in the vessel´s hull. If the cable's screen is grounded for potential equalization, EMC shielding or EMP protection, an unwanted DC current path might occur between the vessel's metallic body and radio communication equipment. By installing a proISO™ device just after the cable inlet a complete ground loop protection is achieved. No artificial floatings are required anymore.

Prevent ground loops and increase performance

- fast deployment in retrofits
- suitable for all radios and antennas
- static discharge protection
- breaks ground loops
- minimizes interference
- makes EMP and EMI protection easy
- fully passive construction
- no wearing components
- customized versions available
- compact size with flexible cable connectors eases installation

Electromagnetic modelling services fine-tunes performance

By using advanced proEMS™ electromagnetical simulation, modeling, analysis and measurement services a complete 3D-electromagnetic environment of the ship's external structures is built and the optimal location for each antenna with the least interference can be found and verified. The proEMS™ services are useful for any size of boat or ship and are tailored for each customer separately.

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proISO™ series of Galvanical Coaxial Cable Isolators

Table 1 Electrical Specifications

Electrical Specifications (TA=25°C)	proISO 1001 (GLI1001)	proISO 1002 (GLI1002)	proISO 1020 (GLI1020)	proISO 1050 (GLI1050)	proISO1021 (GLI1021)
Frequency range (typical)	88MHz – 500 MHz	150MHz -165MHz	88MHz – 800MHz	1MHz – 100 MHz	88-800MHz
Frequency range (extended)*	50MHz – 5 GHz	50MHz - 1GHz	-	1MHz – 500 MHz	-
Impedance	50Ω	50 Ω	75Ω	50Ω	75Ω
Return Loss (extended)	>20 dB	> 25 dB (>15 dB)	>20 dB	>20 dB	>20 dB
Insertion Loss (extended)	< 0.5 dB	< 0.2 dB (<0.5 dB)	< 0.5 dB	< 0.5 dB	<1.0 dB
Power Handling (continuous total)	50W	50W	B10W (receiver only)	250 W	10W
Power Handling (peak)**	100W	100W	-	300W	receive only
Connectors	N-type female	UHF female (ANT) UHF male (VHF) M4 terminal for GND	BNC-type female	N-type female	BNC-type female
Interference rejection	High	High	X-band radar	High	X-band radar AIS 162MHz 450MHz
Static Discharge protection	No	Yes	No	No	No

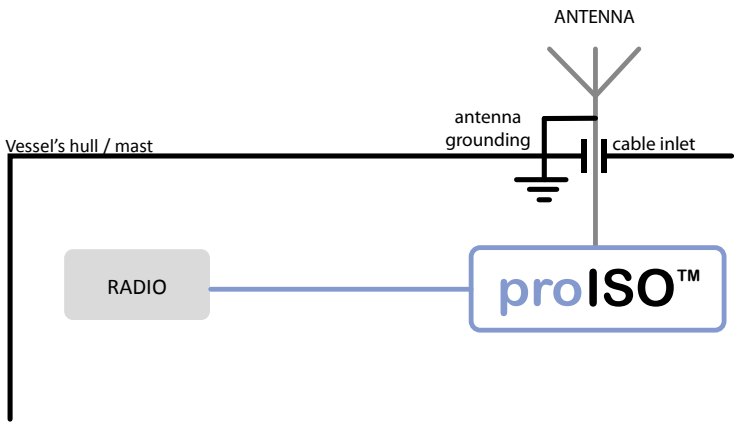
(* works beyond typical operating range with sligthly reduced performance)

(** Maximum tolerable peak value for antenna with better SWR < 2.5)

Table 2 Mechanical and Environmental properties

Mechanical and Environmental properties (TA=25°C)	proISO 1001	proISO 1020	proISO 1021	proISO 1050	proISO 1002
Dimensions	32mm (h) x 57mm (w) x 130mm (l) (with cables 320mm)				32mm x 57mm x 145mm (~500mm cable with UHF male)
Weight	about 200g				
Material	Painted aluminium				
Ingress protection	IP65 shock proof				
Operational environment	-20° - +60° C non condensing				
Standards	All proISO™ products are to the standard of IEC60945 to insure safe operation in the environment on relevant parts. Some of the criteria are operating temperature, storage temperature, humidity, vibration, electromagnetical compatibility.				

Connection example



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proISO™ Grounding Protectors

proISO™ series of Grounding Protectors for dGPS and Navtex antennas and MF/HF applications are professional high-quality isolators. proISO™ grounding protectors create galvanical isolation between active antenna element and vessel's ground. proISO™ technology is designed especially for demanding marine and military environments.

proISO 2001 is used to replace grounding wire of dGPS/Navtex reception antenna. It creates DC- isolation between active antenna and vessel's ground while still ensuring RF ground connection for interference free reception of received signals.

proISO2003 and 2004 are grounding protectors for MF/HF communication systems. The model 2003 can be used to isolate MF/HF radio transmitter and model 2004 is specially designed for MF/HF antenna tuner grounding. They work on all kind of MF/HF communication systems including power fed Antenna Tuner (ATU) units.

proISO™ series of grounding protectors does not only prevent the formation of harmful ground leaks but it also works as lightning protector and dissipates harmful static charges from antenna elements.

proISO™ technology enables trouble free galvanic isolation of communication system. Due to its high performance and innovative design, safety is never compromised and the quality of communication is secured.

Prevent ground loops, increase performance Less trouble!

- fast deployment in retrofits
- replaces antennas' ground wire
- static discharge protection
- breaks ground loops
- enables lightning and surge protection
- makes EMP and EMI protection easy
- fully passive construction
- compact size with flexible cables eases installation

Electromagnetic modelling services fine-tunes performance

By using advanced proEMS™ electromagnetical simulation, modeling, analysis and measurement services a complete 3D-electromagnetic environment of the ship's external structures is built and the optimal location for each antenna with the least interference can be found and verified. The proEMS™ services are useful for any size of boat or ship and are tailored for each customer separately.

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proISO™ Grounding Protectors

Table 1 Electrical Specifications

Electrical Specifications (TA=25°C)	proISO 2001 (GLI2001)	proISO 2003 (GLI2003)	proISO 2004 (GLI2004)
Frequency range (typical)	285KHz –325KHz (dGPS)	1MHz – 30MHz	2MHz – 30 MHz
Frequency range (extended)*	C100KHz-600KHz Navtex (490/518kHz)	1MHz - 80MHz	-
Power Handling (continuous total)	50W	150W	250 W
Power Handling (peak)**	N/A	200W	300W
Connectors	1.5mm² copper wire	6mm² tinned copper wire	40mm wide copper plate
Resistance to ground	1Mohm	1Mohm	1Mohm
Lightning protection	Yes, threshold voltage 230V, Conductivity 10KA		
Static Discharge protection	Yes		

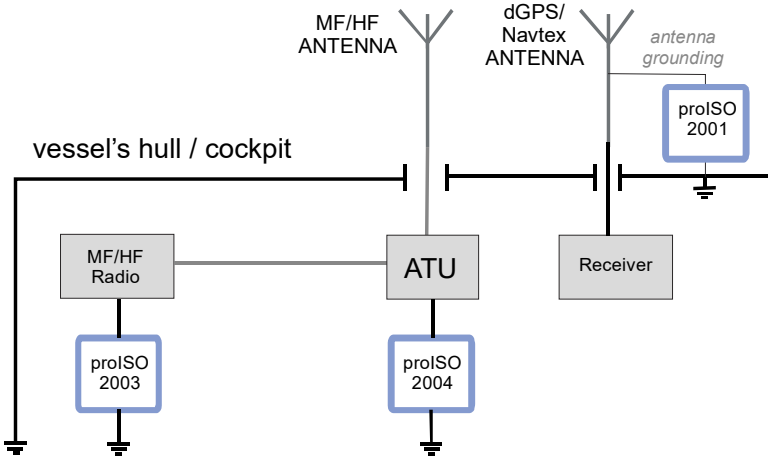
(* works beyond typical operating range with sligthly reduced performance)

(** Maximum tolerable peak value for antenna with better SWR < 2.5)

Table 2 Mechanical and Environmental properties

Mechanical and Environmental properties (TA=25°C)	proISO 2001	proISO 2003	proISO 2004
Dimensions	diameter: 30mm length: 150mm cable length: 200mm	diameter: 30mm length: 150mm cable length: 200mm	hwidth: 40mm length: 240mm thickness: 20mm (max)
Weight	about 60g	90g	85g
Material	thermoplastic sealed aluminium body		thermoplastic sealed copper body
Ingress protection	IP68 shock proof		
Operational environment	-40° - +80° C		
Standards	All proISO™ products are to the standard of IEC60945 to insure safe operation in the environment on relevant parts. Some of the criteria is operating temperature, storage temperature, humidity, vibration, electromagnetical compatibility.		

Connection example



4-way GPS/GNSS Signal Splitter

proGPS™ series of 4-way GPS/GNSS Signal Splitters is a professional high-quality satellite positioning system signal splitter. It is designed especially for demanding marine and military environments.

proGPS™ series of GNSS (Global Navigation Satellite System) Signal Splitters includes both active and passive, galvanically isolated and non-isolated versions of signal splitters. The proGPS™ series covers all navigation satellite systems including GPS, Glonass, Compass and Galileo and both their public and private frequencies.

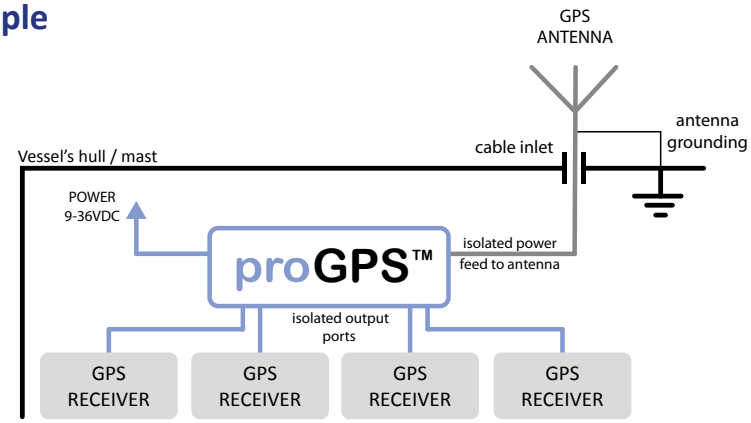
The operation is simple and reliable. proGPS™ splitters distribute GPS/GNSS antenna signal from one ideally located GPS/GNSS antenna to up to four independent navigation receivers maintaining complete galvanical and radio frequency isolation between receivers preventing one faulty receiver to interfere with others. Thus proGPS™ improves performance of a single GPS/GNSS receiver and minimizes the occupied space on the ship's topside.

proGPS™ technology protects the GPS/GNSS signal from jamming and minimizes interference. Thus it provides an outstanding signal quality and navigation solution for GPS receivers. Not only does it isolate the GPS/GNSS receivers from each other, but also from the antenna and the external power supply.

Advanced features create advantage

- supports all satellite navigation systems
- instant installation to retrofits
- no ground leaks from GPS/GNSS system
- optimum location for GPS/GNSS antenna
- only "one" position for the GPS/GNSS receivers
- reduced cabling
- less space occupied at ship's topside
- galvanically isolated antenna from receivers
- galvanically isolated from ship's mains power
- galvanically isolated from the ground
- signal protection with high interference rejection

Connection example



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4-way GPS/GNSS Signal Splitter

Table 1 Electrical Specifications

Electrical Specifications (TA=25°C)	proGPS 1101 (GSP1101)	proGPS 1120 (GSP1120)	proGPS 1200 (GSP1200)
Antenna Port (grounded)	1575.42MHz (pass band 1550-1590MHz) RL: >5dB (avg.) Coax Shield connected to case body	1575.42 / 1605MHz (pass band 1550-1626MHz) RL: > 10dB (avg.) Coax Shield connected to case body	1100-1650MHz RL: > 10dB (avg.) Coax Shield connected to case body
Receiver Ports	OUT1: gain: 1dB - 3dB (L1) -2dB – 1dB (E1/E2) (+/- 0,5dB)	OUT1: gain: 3dB - 5dB (+/- 0,5dB)	OUT1: gain: -10dB (+/- 1dB) DC pass through to ANT
	OUT2: gain: 1dB - 3dB (L1) -2dB – 1dB (E1/E2) (+/- 0,5dB)	OUT2: gain: 3dB - 5dB (+/- 0,5dB)	OUT2: gain: -10dB (+/- 1dB)
	OUT3: gain: 1dB - 3dB (L1) -2dB – 1dB (E1/E2) (+/- 0,5dB)	OUT3: gain: 3dB - 5dB (+/- 0,5dB)	OUT3: gain: -10dB (+/- 1dB)
	OUT4: gain: 1dB - 3dB (L1) -2dB – 1dB (E1/E2) (+/- 0,5dB)	OUT4: gain: 3dB - 5dB (+/- 0,5dB)	OUT4: gain: -10dB (+/- 1dB)
Galvanical isolation:	Receiver ports: DC floating Antenna: DC grounded Power supply: DC floating	Receiver ports: DC floating Antenna: DC grounded Power supply: DC floating	Receiver ports: DC grounded Antenna: DC grounded
Power Supply isolation voltage	9-36 VDC, 0.2A (max) 500V	9-36 VDC, 0.2A (max) 500V	N/A
Reverse polarity protection	Yes	Yes	N/A
Port Isolation (between outputs)	> 30dB (avg.)	>30dB (avg.)	>30dB
Port impedance	50ohm	50ohm	50ohm
Connectors	N – female	N - female	TNC – female
Resistance to ground	Body grounded with coax shields, antenna port shield and radio port shields in common potential		

Table 2 Mechanical and Environmental properties

Mechanical and Environmental properties (TA=25°C)	proGPS 1101 (GSP1101)	proGPS 1120 (GSP1120)	proGPS 1200 (GSP1200)
Dimensions	height: 34mm width: 150mm length: 67mm	height: 34mm width: 150mm length: 67mm	height: 34mm width: 150mm length: 67mm
Weight	about 350g	350g	350g
Material	aluminum body		
Mounting	lid with M5 holes (4x)		
Ingress protection	none		
Operational environment	-20° - +60° C		
Standards	All proGPS™ products are designed to the standard of IEC60945 to insure safe operation in the environment on relevant parts. Some of the criteria are operating temperature, storage temperature, humidity, vibration, electromagnetical compatibility. proGPS 1101 is designed to meet the IMO resolution MSC.112(73) chapter 4. Protection standards to GPS receivers and it is designed not to degrade performance as stated in chapter 3.	All proGPS™ products are designed to the standard of IEC60945 to insure safe operation in the environment on relevant parts. Some of the criteria are operating temperature, storage temperature, humidity, vibration, electromagnetical compatibility. proGPS 1120 is designed to meet the IMO resolution MSC.112(73), MSC.113(73) and MSC.115(73) chapter 4. Protection standards to GPS/Glonass receivers and they are designed not to degrade performance as stated in chapter 3.	proGPS 1200 is designed to the standard of IEC60945 to insure safe operation in the environment on relevant parts. Some of the criteria are operating temperature, storage temperature, humidity, vibration, electromagnetical compatibility. proGPS 1200 is designed to meet the IMO resolution MSC.112(73), MSC.113(73) and MSC.115(73) chapter 4. protection standards to GPS/Glonass receivers

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72-Channel concurrent GNSS receiver

proGPS™ 2000 is a concurrent GNSS receiver with exceptional performance, which has been achieved by using only the top of the class components.

proGPS 2000 is a high performance, 72-channels concurrent GNSS receiver with advanced jamming and spoofing detection. It's is highly configurable, so it should be usable with most of the imaginable systems and other devices. It has very low power consumption levels. Receivers aluminium body, with high quality connectors and brass cable glands makes receiver usable in though conditions.

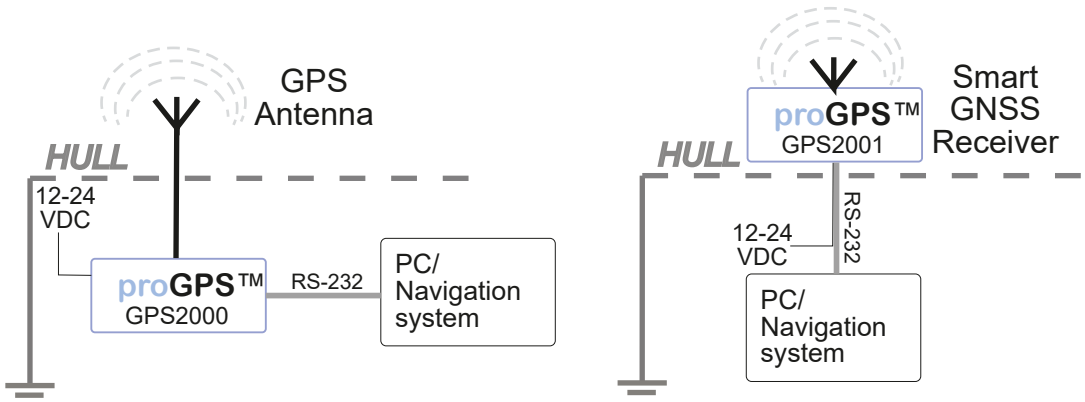
proGPS 2000 supports multiple GNSS systems. proGPS™ can receive and track the L1C/A signals provided at 1575.42 MHz by the Global Positioning System (GPS). It can receive and track the L1OF signals GLONASS provides at 1602 MHz + k*562.5 kHz, where k is the satellite's frequency channel number (k = –7,..., 5, 6). It also can receive and process the B1I signals broadcast at 1561.098 MHz from the BeiDou Navigation Satellite System.

proGPS™ receivers also support reception of SBAS broadcast signals. These systems supplement GNSS data with additional regional or wide area GPS augmentation data. Supported SBAS types are GAGAN, WAAS, EGNOS and MSAS.

proGPS2000 Highlights

- Concurrent reception of up to 3 GNSS (GPS, Galileo, GLONASS, BeiDou)
- Industry leading –167 dBm navigation sensitivity
- Security and integrity protection
- Supports all satellite augmentation systems
- Advanced jamming and spoofing detection

Connection example



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GNSS receiver with integrated antenna

proGPS™ 2001 is a concurrent GNSS receiver with exceptional performance, which has been achieved by using only the top of the class components.

proGPS 2001 is a high performance, 72-channels concurrent GNSS receiver with advanced jamming and spoofing detection. It's is highly configurable, so it should be usable with most of the imaginable systems and other devices. It has very low power consumption levels.
GNSS receiver is included inside an promarine's proTAC family active GNSS antenna. proGPS 2001 has one 5-pin MIL-C connector, from which data and power is provided to/from the device.

proGPS™ receivers also support reception of SBAS broadcast signals. These systems supplement GNSS data with additional regional or wide area GPS augmentation data. Supported SBAS types are GAGAN, WAAS, EGNOS and MSAS.

proGPS2001 Highlights

- Concurrent reception of up to 3 GNSS (GPS, Galileo, GLONASS, BeiDou)
- Industry leading –167 dBm navigation sensitivity
- Security and integrity protection
- Supports all satellite augmentation systems

Table 1 Technical Specification

Receiver type	72-channels concurrent GNSS receiver	**LNA gain**	28dB typical (+/-2dB) noise figure 1dB typical
Supported channels	GPS L1C/A SBAS L1C/A QZSS L1C/A GLONASS L1OF BeiDou B1 Galileo E1B/C	**Out of band rejection**	< 1500 MHz: > 32 dB < 1550 MHz: > 25 dB > 1640 MHz: > 35 dB
Time to first fix	Cold start: 26 – 29 s Hot start: 1s	**Power supply range**	+12 – +24 VDC
Sensitivity	Tracking: -164 - -162 dBm Reacquisition: -159 dBm Cold start: -147 dBm Hot start: -156 dbM	**Size**	radome height:108 mm radome width 91 mm flange width: 140 mm
Navigation update rate	5 Hz *(Default GPS/GLONASS)* 10 Hz *(Option GPS only)*	**Materials**	mounting flange: anodized/painted aluminum radome: ASA plastic RAL5000
Interface	UART *(Default 4800 baud, 8N1)*	**Weight**	~590g
Communication protocol	NMEA 0183 *(Default is version 4.0)*	**Environment**	-40° - +80° IP67

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proTAC 8000 series Tactical Interference proof precision GNSS antennas

Extremely robust active antennas for GNSS (GPS, Glonass, Galileo…) navigation receivers. They utilize innovative dual quadrature feed technology with up to two stage low noise amplifiers to maximize the rejection of sub-harmonics and L-Band signals.

Advantages

(compared to traditional antennas)

- truly circular response over the entire antenna bandwidth
- superior rejection of multipath and cross polarized signals
- maximum filtering against interfering signals
- mechanical design attenuates signals from low elevation (horizon)

Models

proTAC 8001 is designed specially for use with proGPS series isolated GPS signal splitters. It's DC-grounding adds protection towards EMC, static charging and lightning strikes while proGPS fully isolated DC feed ensures trouble free use even in aluminum made vessels.

proTAC 8002 is designed to easily replace existing marine GPS antennas in high interference environments. It is DC-floating design enables the use with any GPS receiver and TNC connector fits to most existing antenna cables.

A-models have have high quality low noise amplifiers and bandpass filtering in addition to mechanical filtering against low elevation (near horizon) signals like marine VHF, harmonics etc.

B-models have in addition to A-model features a special two stage low noise amplifier and band bass filtering design in order to further attenuate all unwanted signals.

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proTAC 8000 series Tactical Interference proof precision GNSS antennas

Electrical Specifications (TA=25°C)		
Specification	**proTAC 8001 A/B**	proTAC 8002 A/B
Type	Tactical Interference proof high precision GNSS antenna	
RF Specification	Active GNSS antenna A-model: 1 stage low noise amplifier and bandpass filter B-model: 2 stage low noise amplifiers and bandpass filters	
1dB Bandwidth	A – model: 1575-1606MHz B – model: 1574-1606MHz	
LNA gain	28dB typical (+/-2dB) noise figure 1dB typical	25dB typical (+/-2dB) noise figure <3.5dB typical
Out of band rejection	A – model: < 1500MHz: > 32dB < 1550MHz: > 25dB >1640MHz: > 35dB B – model: < 1550MHz: > 50dB >1640MHz: > 70dB	
Axial Ratio	<1.5dB @zenith	
Connector	N-female	TNC-female
Grounding	DC-grounded	DC-floating
Power supply	2.5-16VDC, 15mA	
ESD circuit protection	15kV	
Mechanical	Radome height: 75mm, width 91 mm Mounting flange width: 140 mm	
Mounting	140mm flange mount (NATO mount) with 4 xM10 holes DCD115mm Mounting options (AISI304): 140mm flange to BSP1”-11TPI thread (ACCANT1001) BSP1”-11TPI to 1”-14TPI “GPS thread” (ACCANT1002) 140mm flange to 50-75mm pipe/wall mount (ACCANT1003)	
Material	Mounting flange: anodized/painted aluminum radome: ASA plastic RAL5000	
Environment	-40 to +85°C IP 68	

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Tactical Communication Solutions

Promarine's tactical communication products are specially designed for fast and small patrol vessels. They allow the installation of multiple radios without increasing the amount of antenna and thus risking vessel's mission capabilities.

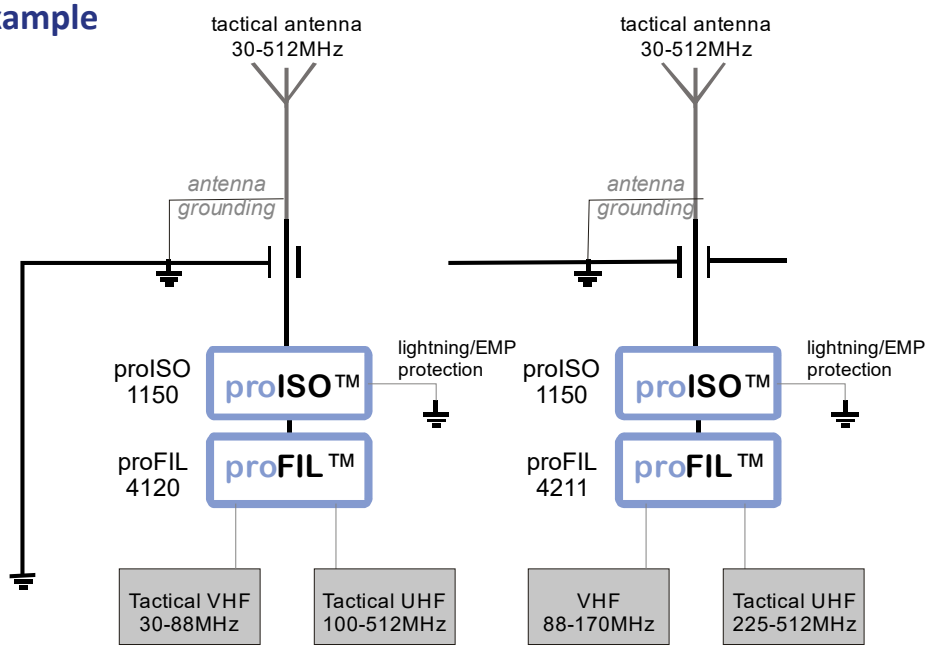
proFIL 4120 and proFIL 4211 are designed to be used with tactical wideband antennas ranging from 30MHz up to 512MHz. Their low loss design enables the use of high power transmitters simultaneously.

proISO 1150 combined galvanic isolator and lightning protector protects communication system from lightning strikes, EMPs, interference and static discharges. It also protects vessel's metal hull from corrosion caused by DC-ground leaks.

Combining several transmitters and receivers to single antennas by using advanced proFIL™ technology creates instant advantages. Risks that are avoided immediately are:

- reduced co-site interference
- reduced intermodulation
- saved space
- reduced overhearing

Connection example



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Tactical Communication Solutions

Electrical Specifications (TA=25°C)			
Product	**proFIL** **Tactical Communication Combiners**		**proISO 1150** **Tactical Communication Galvanic Isolator and Lightning protector**
Model	FIL4120	FIL4211	GLI1150
Type	Medium isolation / high power antenna combiner		Capacitively coupled galvanic isolator/ DC-block with integrated lightning protector
RF specification			
Standard frequency range	30-80MHz / 108-400MHz	80-170MHz / 225-400MHz	30-512MHz
Extended frequency range	30-80MHz / 100-512MHz	30-170MHz / 225-512MHz	1MHz – 1GHz
RF-specification (standard range)	RL: <-20dB (avg) Loss: < 1.0dB Isolation: < 35dB POWER: 150W		RL: <-25dB (average) Loss: < 0.5dB POWER: 250W
RF-specification (extended range)	RL: <-10dB (avg) Loss: < 1.5dB Isolation: < 20dB POWER: 150W		RL: <-20dB (average) Loss: < 1.0dB POWER: 150W
Lightning protection	n/a		threshold voltage: 230V surge capability: 10kA (according to IEC61000-4-5) non replaceable

Mechanical & Environmental specifications		
Product	N-female connectors Material: Aluminum Connector chassis and case grounded	N-female connectors Material: Aluminum Connector chassis and case isolated
Environment	0°-40°C non condensing	-20°- 60°C non condensing IP65
Size	150 x 150 x 60 mm	w&h: 42 x 42 mm, body length 130 mm, length with cables 300 mm
Mounting	M4 holes on bottom lid, wall mount	hanging, cable rail
Options	n/a	ACC2001: DIN RAIL / WALL MOUNT CLIP

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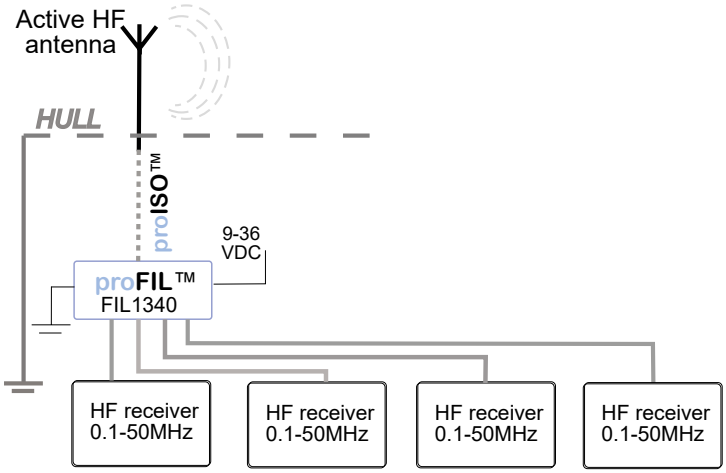
proFIL 1340 4-Way isolated active antenna splitter

4-Way active power splitter for 0.1-50MHz RX applications.

It's integrated low noise amplifier compensates splitting loss and adds small amplification to 5dB. It is completely galvanic isolated and its design prevents ground loops and leaks to occur.

It's > 30dB RF isolation protects receivers from simultaneous noise and interference.

Connection example



Filter specification

Filter type	4-way power splitter	Connectors	BNC-type (female)
	Amplified and isolated	Power	9-36 VDC (protected)
Frequency	0.1-50MHz	Material	Aluminum
Input	Lightning protected max power 2W grounded	Mounting	M4 holes on lid
Receive loss	better than -20dB	Size	119x110x30mm weight: 0.32kg
Output Isolation	RF better than 30dB galvanic DC-floating	Environment	non condensing -40° - +80° shock proof
Amplification	5dB	Model	FIL1340
Options	custom RF-connectors power feed to antenna	Status	available

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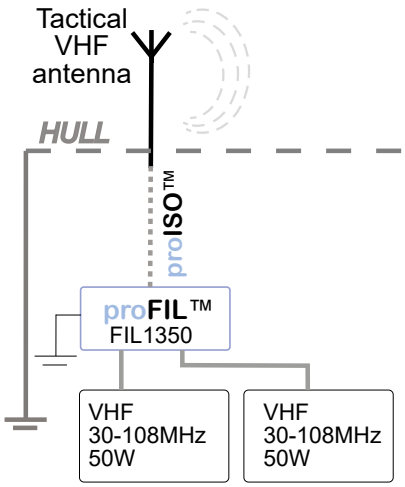
proFIL 1350 Tactical VHF Antenna Splitter

Power splitter that combines two tactical VHF transceivers to the same antenna.

Medium <30dB Isolation.

Connection example



Filter specification

Filter type	Power divider	Connectors	N-type (female)
Frequency	30-108MHz	Material	Aluminum
Power	100W peak, continuous 50W	Mounting	M4 holes on lid
Receive loss	average -20dB (minimum <-10dB)	Size	149x110x50mm weight: 0.6kg
Isolation	7-28dB	Environment	non condensing -40° - +40° shock proof
Insertion loss	3,1dB	Model	FIL1350

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proFIL 4151 Tunable Cavity Bandpass Filter

(preliminary datasheet, specification can change without notice)

proFIL4150 range of bandpass filters covers UHF band.

proFIL 4151 is manually tunable cavity bandpass filter for lower NATO 1 band (225-325MHz).

proFIL 4151 is designed to minimize in-band and out-band harmonic and spurious transmissions from high power tactical transmitter.

Its low loss design and steep attenuation curve makes it ideal for base station use.

Its compact size and easy tuning makes its use possible also in mobile use.

FILTER SPECIFICATION (typical values)

Filter type	Band pass cavity filter	Connectors	N-type (female)
Frequency	225-325MHz	Material	Aluminum
Power	100W	Mounting	
Receive loss (@225MHz)	better than -12dB average -18dB	Receive loss (@325MHz)	better than -10dB average -17dB
Pass Band attenuation (center @225MHz)	min: 0,9 dB <1,5dB @4MHz band	Pass Band attenuation (center @325MHz)	min: 0,54dB < 1,5dB @4MHz band
Stop Band attenuation (Center @225MHz)	-70MHz : <-78dB +70MHz: <-72dB +140MHz: < -80dB -140MHz: < -85dB	Stop Band attenuation (Center @325MHz)	-70MHz : <-64dB +70MHz: <-64dB +140MHz: < -66dB -140MHz: < -86dB
Insertion loss	dB	Model	FIL4151
Size	270x180x50mm weight: 1.8kg	Environment	non condensing -40° - +80°

Ask for other Tunable Cavity Bandpass filter mode

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proTAC 5220 Data communications antenna for NATO 1 band

HIGHLIGHTS

- Superior 225-400MHz high efficiency antenna specially for tactical MIMO radios
- NATO compatible 4-bolt flange mount
- does not require ground plane – mast installation possible

DESCRIPTION

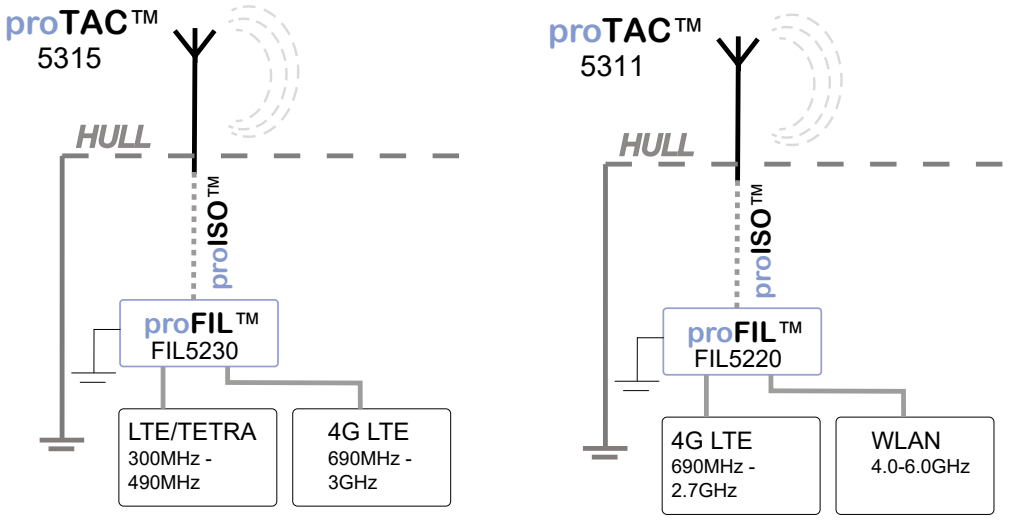
In a maritime environment where narrow vertical radiation pattern is not accepted because of rapidly changing minimums and maximums due to vessel rolling the proTAC 5220 brings in the solution with its lossless high efficiency design.

proTAC 5220 is specially designed for modern tactical MIMO UHF radios. It is omnidirectional and has wide enough vertical pattern for reliable communications link. In comparison with other leading manufacturers the proTAC 5220 has also gain advantage.

TECHNICAL SPECIFICATIONS

Model:	proTAC 5220	**Mounting:**	140mm 4-bolt flange mount M10, 1115mm DCD
Type:	Omnidirectional dipole antenna	**Environmental:**	outside
Size (h*l*w):	radome: 620mm (h) 90mm (w) mounting plate: 140mm(w) weight: 1.8kg	**Frequency range:**	225MHz – 400MHz RL: < -9dB (avg -15dB)
Material:	Plastic cover, aluminum mounting plate	**Connectors**	N-female

Connection example



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Noise and Interference Rejection Filters

proFIL™ series of Professional Noise and Interference Rejection Filters blocks efficiently conducted noise from cables and increases system performance. proFIL™ reduces electromagnetic interference much below the levels allowed by EMC regulations.

proFIL 0100 series Power Line Noise filters is designed to reduce noise and interference from the switched mode power supplies. They attenuate effectively low frequency switching frequencies and higher harmonic frequencies caused by unintentional interaction with high power rf-transmissions.

proFIL 1010 series Coaxial Cable Interference Filters are designed to minimize interference that is travelling backwards in coaxial cables due to antenna circuit mismatch, reflections around antenna and cable faults. If present, this interference shows erratic behavior in other electronics and electrical equipment like sporadic activations, data errors, clicks and cracks. It can also activate other transmitters and make them oscillating on other frequencies. In higher power transmitters it can create strong electromagnetic field inside the cockpit which can exceed even healthy limits. proFIL 1010 does not block DC-current thus it can be used in coaxial cables that supply control signals and DC power to the antenna tuner.

Due to the innovative design of proFIL™ technology, products do not have attenuating effect to original signal. This makes them easy to adapt in any situation without the fear of losing performance.

High-performance proFIL™ technology enables modern communication without compromising safety and performance. Its low loss and medium isolation output ports improves the overall performance of the communication system in comparison to the traditional one antenna – one radio approach. proFIL™ technology is proven and being used by many governments and authorities in Europe.

Less noise, no interference

- minimizes power supply noise
- easy to try and install
- keeps EMI levels at minimum
- zero loss technology

Electromagnetic modelling services fine-tunes performance

By using advanced proEMS™ electromagnetical simulation, modelling, analysis and measurement services a complete 3D-electromagnetic environment of the ships external structures is built and the optimal location for each antenna with the least interference can be found and verified. The proEMS™ services are useful for any size of boat or ship and
are tailored for each customer separately.

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Noise and Interference Rejection Filters

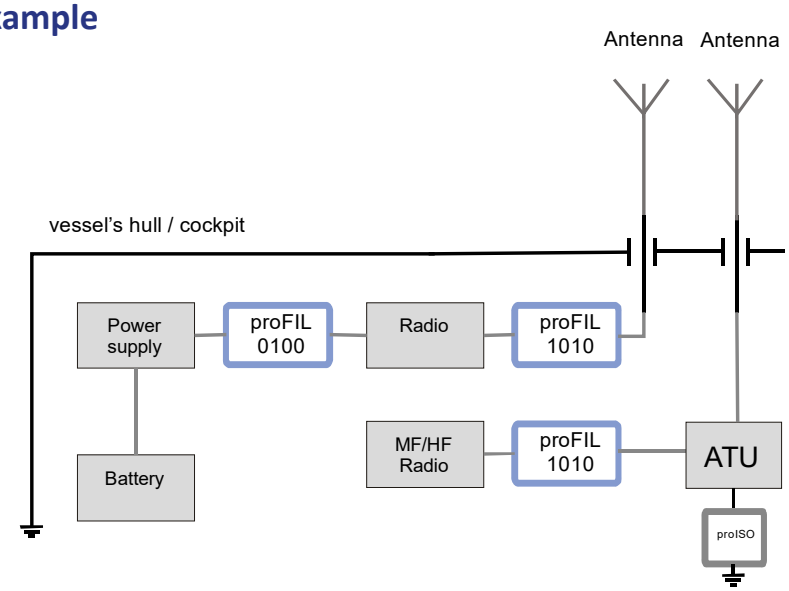
Table 1 Electrical Specifications

Electrical Specifications (TA=25°C)	proFIL 0100 (FIL0100)	proFIL 0101 (FIL0101)	proFIL 1010 (FIL1010)
Power	DC: 30V / 8A	DC: 30V/ 10A	max 250W
Interference rejection	Common mode / differential mode < 1MHz (>40dB) 1- 30MHz (>15dB) 30-300MHz (10-15dB)	Common mode 10MHz – 1GHz (~15dB)	1-30MHz : > 15dB no DC block
Insertion Loss	N/A	N/A	< 0.5 dB
Port impedance	N/A	N/A	50ohm
Connectors/Terminals	Open end 2.5m2 conductors (+/-)	Open end 2.5m2 conductors (+/-)	N -female
Resistance to ground	Body grounded with yellow/green protective ground wire	Body floating	Body grounded with coax shields, antenna port shield and radio port shields in the same DC- potential

Table 2 Mechanical and Environmental properties

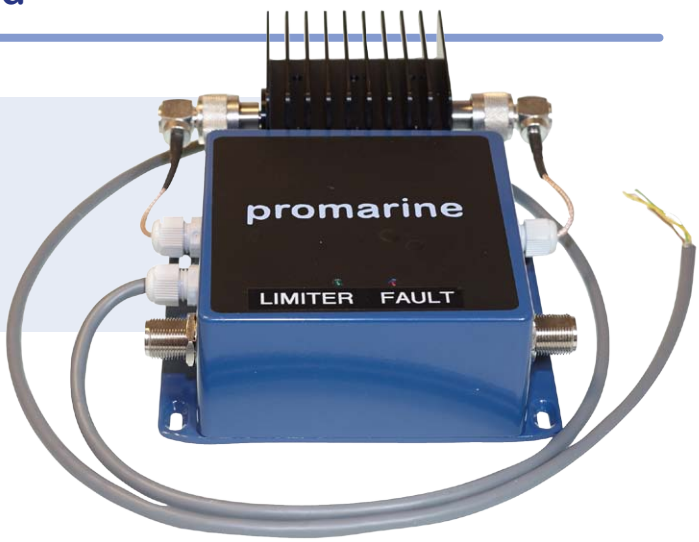
Mechanical and Environmental properties (TA=25°C)	proFIL 0100 (FIL0100)	proFIL 0101 (FIL0101)	proFIL 1010 (FIL1010)
Dimensions	height: 60mm width: 150mm depth: 60mm	height: 45mm width: 110mm depth: 45mm	height: 45mm width: 165mm depth: 45mm
Weight	about 550g	300g	350g
Material	aluminum body		
Mounting	-	-	-
Ingress protection	IP54		
Operational environment	-30° - +60° C		
Standards	All proFIL™ products are to the standard of IEC60945 to insure safe operation in the environment on relevant parts. Some of the criteria are operating temperature, storage temperature, humidity, vibration, electromagnetical compatibility.		

Connection example



2W Power Limiter for marine VHF band

proATT 1201 2W Power Limiter for marine VHF band is innovative transmission power limiter to be used in vessels operating in explosive atmospheres (ATEX).



proATT 1201 allows ship owner and naval architect to gain ATEX conformance for their patrol boat when operating the ship's radio transmitters in hazardous areas declared as explosive atmospheres.

proATT 1201 operation is simple. In normal operating mode MARINE VHF transmission is pass through without attenuation. In ATEX operating mode MARINE VHF transmission is attenuated to 2W level to comply with regulations while received MARINE VHF signal is passed through unattenuated.

The innovative proATT™ technology minimizes losses in normal operating mode and ensures unattenuated reception of MARINE VHF signals ,even in ATEX operating mode. Thus it maintains the overall performance of the communication system under any circumstances.

Prevent ground loops, increase performance, less troubles

- easy to use and install
- enables the ATEX conformity of a vessel
- failsafe operation
- high performance and reliability

Electromagnetic modelling services fine-tunes performance

Use our advanced proEMS™ electromagnetical simulation, modelling, analysis and measurement services to create a complete 3D-electromagnetic environment of the ships' external structures. This way the optimum location for each antenna with the least interference can be found and verified. The proEMS™ services are useful for any size of boat or ship and will be tailored for each customer separately.

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2W Power Limiter for marine VHF band

Technical features

Product Type:
Automatic simplex 2W RF power limiter for VHF band

Power supply:
+24VDC external power required

Attenuator features:
Frequency range: 150MHz - 180MHz
Max power handling: 50 W

Normal mode:
Insertion loss/attenuation (RX/TX): <0.3 dB.
Return loss: >22 dB

ATEX mode:
Attenuation (TX): 10.3dB
Attenuation (RX): 0.3dB
Return loss: >22dB

Connectors:
N-female connectors
2-wire cable for remote control (+24VDC signal to activate ATEX mode)

Approvals:
Meets IEC 60945 specification

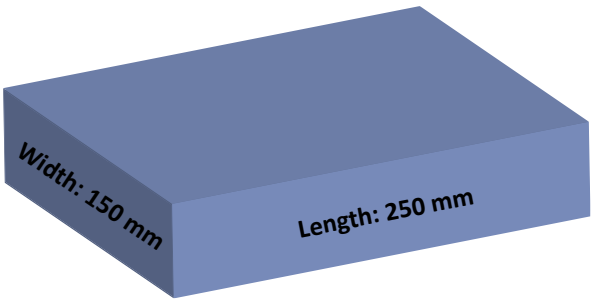
Environmental:
Case IP65
Operating temp: -20° - +60° non condensing

Dimensions:
Height: 80 mm
Width: 150 mm
Length: 250 mm
(with connector cables 300 mm)
Weight: 800 g

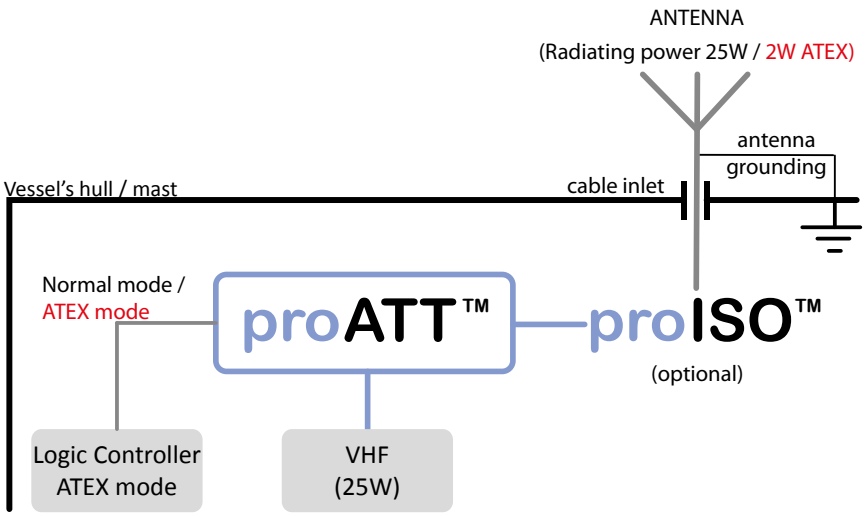
Order code:
FIL1201: proATT 1201 2W Power Limiter for MARINE VHF

Delivery time:
3 months

Dimensions:
Height: 80 mm



Connection example



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2W Power Limiter for TETRA band

proATT 1211 2W Power Limiter for TETRA band is an innovative transmission power limiter to be used in vessels operating in explosive atmospheres (ATEX).

proATT 1211 allows ship owner and naval architect to gain ATEX conformance for their patrol boat when operating the ship's radio transmitters in hazardous areas declared as explosive atmospheres.

proATT 1211 operation is simple. In normal operating mode TETRA transmission is pass through without attenuation. In ATEX operating mode TETRA transmission is attenuated to 2W peak level to comply with regulations and received TETRA signal is fed through unattenuated.

The change of proATT 1211 operating modes is activated remotely by an external switch. To maximize reliability, active operating mode is indicated by LED light and to maximize the failsafe operation maintaining the normal operating mode does not require external power.

The innovative proATT™ technology minimizes the losses in normal operating mode and ensures unattenuated reception of TETRA signals even in ATEX operating mode. Thus it maintains the overall performance of the communication system.

Prevent ground loops, increase performance, less troubles

- easy to use and install
- Enables the ATEX conformity of a vessel
- failsafe operation

Electromagnetic modelling services fine-tunes performance

Use our advanced proEMS™ electromagnetical simulation, modelling, analysis and measurement services to create a complete 3D-electromagnetic environment of the ships' external structures. This way the optimum location for each antenna with the least interference can be found and verified. The proEMS™ services are useful for any size of boat or ship and will be tailored for each customer separately.

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2W Power Limiter for TETRA band

Technical features

Product description:
Automatic full duplex 2W RF power limiter for TETRA band

Power supply:
+24VDC external power required

Attenuator features:
Frequency range: 380MHz - 420MHz
Max power handling: 25 W

Normal mode:
Insertion loss/attenuation (RX/TX): < 0.3 dB
Return loss: <-22 dB

ATEX mode:
Attenuation (TX): 7 dB
Attenuation (RX): 7 dB
Return loss: <-22 dB

Connectors:
N-female connectors
2-wire cable for remote control (+24VDC signal to activate ATEX mode)

Approvals:
Meets IEC 60945 specification

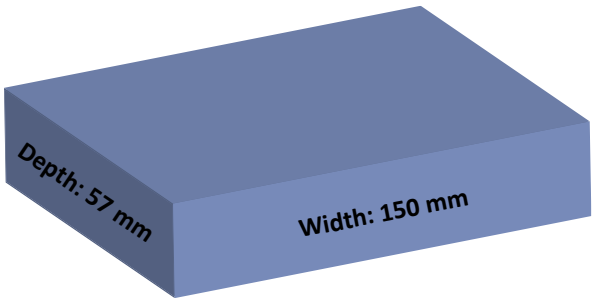
Environmental:
Case IP65
Operating temp: -20° - +60° non condensing

Dimensions:
Height: 32mm
Width: 57mm
Length: 150mm
(with connector cables 300mm)
Weight: 200g

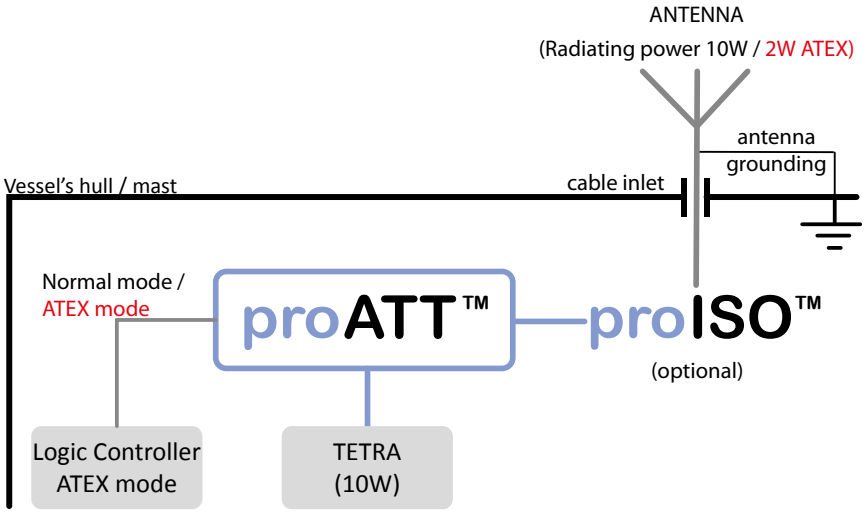
Order code:
FIL1211: proATT 1211 2W Power Limiter for TETRA

Delivery time:
3 months

Dimensions:
Height: 32 mm



Connection example



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proMTX RF switch matrix

4x4 programmable RF Switch matrix from DC to 18GHz.
Simple programming logic and display to show active routes.

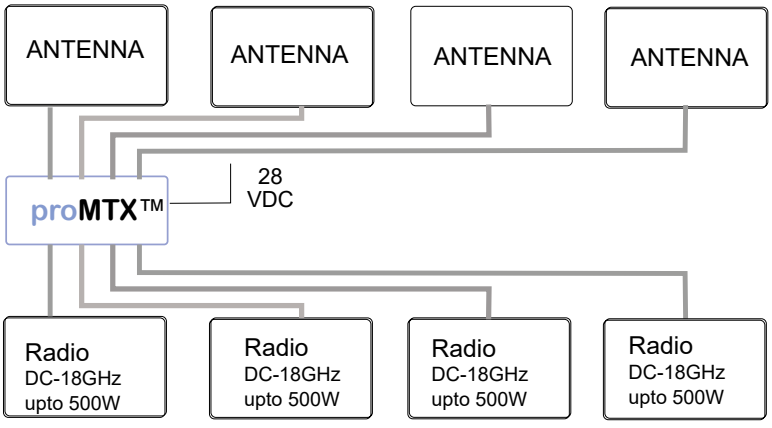
Options: higher matrix size (4x6, 6x6, 8x8…), switch route diagnostics, combined switchable attenuators and combiners, remote control (IP, serial).

Custom operation logic can be factory programmed (allowed routes, …)

MATRIX specification

Matrix type	4 input 4 output	Connectors	N-female
Operation mode	normally open, single in single out switching	Power	28VDC (regulated) ~1A when active
Frequency	DC-18GHz	Material	Aluminum
Input /Output	N-female (body dc-grounded to chassis)	Mounting	19” rack mount 2U
Receive loss Insertion loss	better than -17dB 0,1 – 0,8dB (10-800MHz	Size	440x335x81mm (approx.) weight: 4kg
port Isolation	better than 70dB	Environment	non condensing -0° - +40°
RF power (each route)	500W avg (<100MHz) 150W avg (<1GHz)	Model	TBD

Connection example



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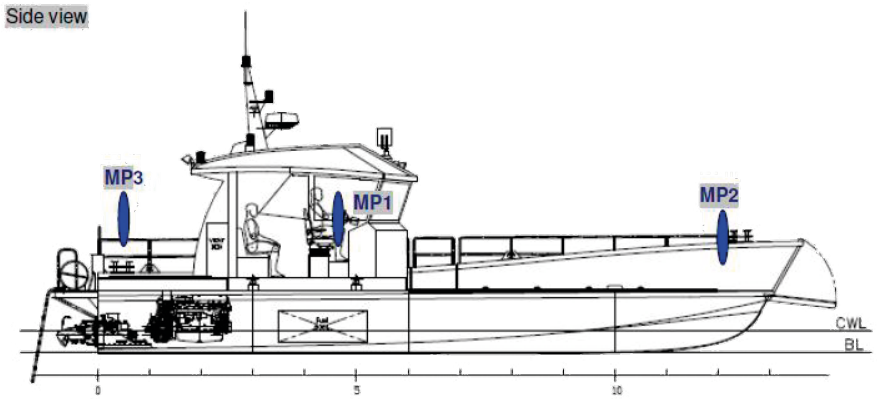
proEMS™
Electromagnetical compatibility modelling and verification services

proEMS™ covers Electromagnetic compatibility related services for maritime, transport and facility industry not exluding other areas.

proEMS™ helps in interference troubleshooting, meeting EMC and safety related standards like human exposure to EM fields and simulating all these before problems occur.

ADVANTAGE

- Avoid problems
- Early stage problem solving
- higher performance
- less interference and errors
- satsified customer
- increased safety



SERVICE HIGHLIGHTS

- EMI troubleshooting
- RF performance and operability measurements
- Electromagnetical modelling simulations
- Communication system installation verification tests/measurements
- EMC training

Measurements	Measured parameter	Measurement range	Standards
Electric Field Strength	V/m uW/cm²	[100kHz – 2.7GHz] [1Hz – 60GHz*]	Directive 2004/40/EC MIL-STD-464
Magnetic Field Strength	A/m	[1Hz – 300kHz]	Directive 2013/35/EC ICNIRP 1998/2010
Antenna circuit attenuation	dB	[1Hz – 8GHz]	
Antenna circuit reflection (SWR)	dB	[1Hz – 8GHz]	
Transmitted power	dBm/W	[0.1MHz-4GHz, 2kW*]	
Simulations			
Antenna radiation pattern	Antenna isolations (interference)	Electric/Magnetic Field Strength	Surface currents

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Antenna Mount adaptor 1

140mm proTAC flange to BSP1”-11TPI pipe thread (R1 inner thread)
A4 stainless steel

ACCANT1001

Mounting accessories

Antenna mount adaptor 2

BSP1”-11TPI (outer) to 1”-14TPI (inner) thread adaptor,
A4 stainless steel

ACCANT1002

Antenna mount adaptor 3

140mm proTAC flange to wall or 50-75mm horizontal/vertical pipe
A4 stainless steel

ACCANT1003

A2 stainless steel U-bolt kit

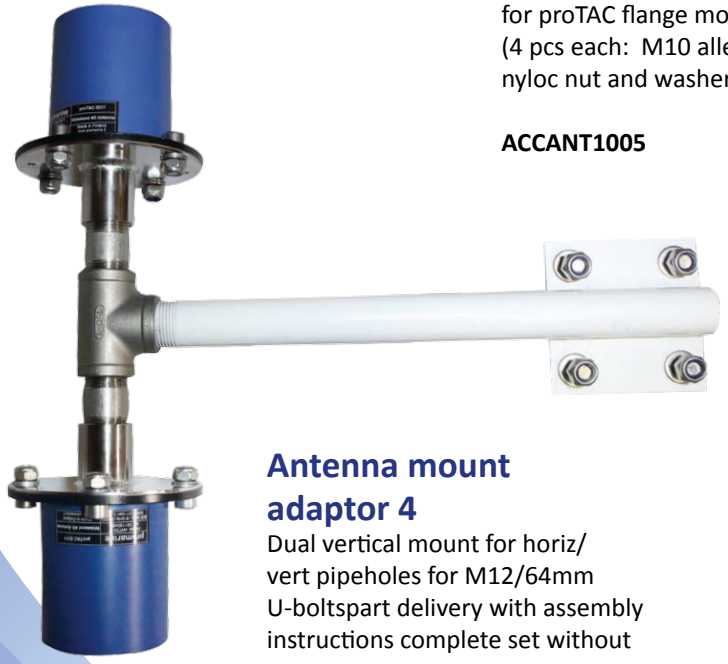
for ACCANT1003/1006
(2 pcs M12/76mm U-bolts, 4 pcs washers and bolts)to fit 64mm pipe

ACCANT1004

A4 stainless steel bolt kit

for proTAC flange mount
(4 pcs each: M10 allenkey bolt, nyloc nut and washer)

ACCANT1005



Antenna mount adaptor 4

Dual vertical mount for horiz/vert pipeholes for M12/64mm U-boltspart delivery with assembly instructions complete set without antennas

ACCANT1006

Pipe adaptor

Steel tube, open ends, 50mm inner diameter/60mm outer diameter, 3pcs M10 lock screws,
weigth 1,4kg, length 20cm
(to fit 64mm U-bolt to smaller than 50mm diameter vertical pipe)

ACCANT1007

Trimble thread adaptor

5/8” Trimble thread (outer)
to 1”-14TPI marine thread (outer),
AISI304, 30cm long solid

ACCANT1008

A2 stainless steel U-bolt kit

for ACCANT1003
(2 pcs M10/64mm U-bolts,
4 pcs washers and bolts)
to fit 50mm pipe

ACCANT1009

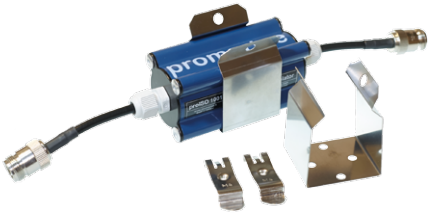
Counter plate kit for U-bolts

(for ACCANT1004 and ACCANT1009)
stainless steel
2pcs U-bolt counter plates

ACCANT1010

Mounting bracket for proISO series

ACC2001



DIN rail clips for proISO mounting bracket (ACC2001)

ACC2003

2-way manual antenna switch UHF connectors

ACC2004

Cable kit 30cm RG223
SMA-RP (female) – SMA-RP (male)
KITCABSMAF04

Cable kit 30cm RG223
SMA(male) – N(female)
KITCABSMAM05

Cable kit 30cm RG223
SMA(male) – N(male)
KITCABSMAM06

Cable kit 30cm RG223
SMA-RP(male) – N(female)
KITCABSMARPNFPR03

Cable kit 50cm RG58
QMA(male)-N(male)
CABJMP01

Cable kit 50cm RG58
QMA(male) – N(female)
CABJMP02

Cable kit 20cm RG58
N(male)-N(male)
CABJMP03

Cable kit 0,7m Aircell 7
N(male) – N(female)
CABJMP04

Cable kit 0,7m Aircell 7
N(male) – N(male)
CABJMP05

Cable kit 40cm RG223
N(male) – N(female)
CABJMP06

Cable kit 40cm Aircell 5
N(male) – N(female)
CABJMP07

Cable kit 2.5m Aircell 7
N(male) – N(male)
CABJMP08

promarine

PROMARINE LTD'S GENERAL TERMS AND CONDITIONS MARCH 2012

These general terms and conditions for sale and purchase ("Terms") shall apply to all sales of Promarine Ltd's ("Promarine") products ("Products") and provision of services ("Services") by Promarine to its customers ("Buyer"), unless explicitly otherwise set forth in the offer or order confirmation given by Promarine or agreed in writing by Promarine and the Buyer (together the "Parties"). The Services may include, but are not limited to, technical design, measurement and installation services.

1 Conclusion of contract

Any offer made by Promarine, is valid for thirty (30) days from the date of the offer. Offers are given without obligation. The sales and/or service contract ("Contract") is concluded and binding upon the Parties when;

i. Promarine has accepted the Buyer's order in writing (order confirmation). Promarine shall confirm the orders placed by the Buyer without any undue delay; or

ii. Promarine has received the written acceptance to Promarine's offer from the Buyer; or

iii. Promarine has delivered the Products and/or Services ordered by the Buyer in writing

2 Products and Services

The Products and/or Services, as well as prices, specifications, quantities, delivery times and other relevant issues related to the Products and/or Services shall be defined in each Contract. The Products and/or Services shall fulfill the requirements and characteristics set forth in the Contract and comply with the applicable law and regulations issued by authorities.

The Buyer shall provide Promarine with correct and sufficient information to enable provision of the Services. The Buyer shall be responsible for any information and instructions given by it to Promarine.
All information and data contained in Promarine's general product documentation, catalogs, brochures, Internet pages, price lists etc. irrespective of their form are not binding unless specifically agreed by the Parties and incorporated into these Terms.

3 License to software

In case the Products and/or Services include Promarine's software or software of a third party, Promarine grants to the Buyer a non-exclusive, non-transferable, non-subliceansable and limited license to use such software contained in the Products and/or Services in accordance with and only for the purposes set out in the user manuals and other instructions provided by Promarine, where available.

4 Price

If the price of a Product and/or Services has not been agreed in the Contract, Promarine's price list effective at the date of order shall apply. The prices are in Euros, unless otherwise agreed by the Parties in writing.

In addition, Promarine has the right to separately charge for expenses arising from the provision of Services as well as for travel, accommodation and daily allowance expenses. Travel arrangements deviating from the customary shall be agreed separately.

All prices are net prices. VAT, any taxes, duty of any kind, export/import costs and other levies or delivery costs are not included in the price and shall be charged separately. If costs of any special services or devices, raw materials or labor costs change substantially before the delivery date, Promarine has the right to adjust the prices accordingly.

After Promarine's offer or order confirmation, all costs due to any addition to or alteration of the Products and/or Services ordered by the Buyer shall be charged separately.

5 Payment
All payments for the Products and/or Services shall be made by the Buyer to Promarine in the form of advance payment prior to delivery of the Products and/or Services (where applicable) unless otherwise agreed between the Parties in writing. Alternatively, Promarine may at its discretion require a security from the Buyer to be deposited for the payment of purchase price.

Payment term is fourteen (14) calendar days from the date of the invoice. Interest at the rate of sixteen (16) per cent p.a. or the amount defined by the applicable law, whichever is higher, will be charged on overdue payment until the full payment of purchase price. In addition, Promarine is entitled to charge reasonable collection costs.

In case of payment default by the Buyer, Promarine is entitled to withhold further deliveries until full payment, including any interests thereto, has been made or to cancel the Contract in question in whole or in part and any other Contract with the Buyer. The Buyer shall not be entitled to withhold or offset payment on the grounds of any warranty claims, other counterclaims or otherwise.

6 Delivery terms

Delivery term for all orders of the Products is Ex Works (Incoterms 2010).

7 Delivery time

Date of delivery is indicated in the offer or order confirmation as accurately as possible. However, delivery times specified are estimates only. Promarine shall promptly inform the Buyer in writing of any expected delay of the delivery, the reasons and effects thereof as well as the estimated new delivery time if possible.

If the Buyer has failed to fulfill its obligations in whole or in part in taking and accepting the delivery, or has in any other way

delayed the delivery, e.g. by addition to or alteration of the order, Promarine is entitled to reasonably extend the time of delivery or to cancel the Contract in whole or in part.

Promarine may make partial or advance shipments. Promarine is not liable for any loss or damage incurred by the Buyer due to Promarine's failure to meet the delivery times. Promarine has no other or greater liability for any delayed delivery.

8 Disclaimer of warranties

Promarine represents and warrants that to Promarine's knowledge, the Products, Services and software contained therein do not infringe any intellectual property right or other proprietary right of any third party.

To the fullest extent permitted by applicable law, Promarine disclaims all promises, representations and warranties with respect to Products and/or Services, including without limitation implied warranties of merchantability, satisfactory quality and fitness for a particular purpose, even if Promarine has been advised of the possibility of such damages.

Promarine Oy Ltd, Vuoritie 6, FI-21600 Parainen, Finland
Tel. +358 2 4542340, Fax. +358 2 4542341, sales@promarine.fi, www.promarine.fi

Promarine shall not be liable for any defect or failure made in accordance with the proof or the Buyer's other specifications or instructions or which is due to e.g. accident, wear and tear, negligent use, tampering, improper handling, use, operation or storage or any other default on the part of any party other than Promarine.

9 Inspection of delivery and claims

The Buyer will examine and inspect the Products on delivery and the Buyer's acceptance will be deemed to occur on the expiry of fourteen (14) days of the receipt of delivery. A claim or any other dispute concerning the delivery shall not free the Buyer from the terms of payment.

The Buyer will promptly and properly report to Promarine any discrepancies the Buyer discovers and will follow any instructions given by Promarine. Any return of the Products is subject to Promarine's prior written acceptance.

Promarine's liability for any defect or failure of the Products shall be limited to, as determined by Promarine, price reduction or replacement of the Products by Promarine, provided that notification of such failure or defect in the Products is given to Promarine in writing immediately upon the same becoming apparent to the Buyer, and provided that on Promarine's request and instruction the Products are promptly returned to Promarine at the Buyer's liability, carriage paid by the Buyer. Promarine is liable for the transportation costs when delivering replaced Products to the Buyer, provided that the returned Products have been found defective by Promarine. Promarine has no other or greater liability for the defected Products.

Neither party will be liable for any failure to perform its obligations under these Terms where the failure arises from an event beyond the reasonable control of the party concerned. Such events may include, but are not limited to, fires, floods, epidemics, quarantine restrictions, strikes, lock-outs, industrial disputes, riots or civil commotion, terrorist activity, transportation, energy, power or data communication failures, freight embargoes, machinery breakdown, unforeseen defects or shortages of raw materials or components and production constraints, currency restrictions and acts of the government in either its sovereign or contractual capacity.

10 Damages and limitation of liability

In case of product liability claims from third parties against the Buyer or Promarine, not falling within Promarine's liability in accordance with the above clauses, the Buyer shall hold Promarine harmless, and indemnify Promarine for any consequences of any and all claims, proceedings, losses, liabilities, costs (including legal costs), damages and expenses. Promarine has no other or greater liability for personal injuries, or damage caused to any property by the Products and/or Services.

In no circumstances shall Promarine be liable for any indirect or consequential loss or damage of any kind (including but not limited to loss of turnover, loss of profit, loss of use, loss of data, goodwill or downtime cost), arising from the Products or the use of the Products sold hereunder and/or the Services.

Notwithstanding anything to the contrary in these Terms, under no circumstances shall Promarine's aggregate total liability for any damages, costs or expenses, for any cause whatsoever, and regardless of the form of action (in contract or tort), and arising out of or relating to the sale of Products exceed the sales price paid by Buyer for the delivered Products or part thereof subject to the claim under these Terms.

Considering inaccuracies contained in the initial data of the Buyer's systems, products or technical environment that forms the basis for Promarine's Services and notwithstanding anything to the contrary in these Terms, under no circumstances shall Promarine's aggregate total liability for any damages, costs or expenses, for any cause whatsoever, and regardless of the form of action (in contract or tort), and arising out of or relating to the Services provided by Promarine, exceed fifteen (15) % of the price paid by the Buyer for the Services or part thereof subject to the claim under these Terms.

11 Title and intellectual property rights

All rights and title to the Products and/or Services (where applicable) belong to Promarine until all outstanding invoices, late payment interest and collection costs have been settled by the Buyer. All risk of loss or damage to the product shall pass to the Buyer in accordance with the terms of delivery specified in section 4.

Promarine (or its licensors) shall own all rights in and to the Products and/or Services, including any copyright, patent, trademark, design right, trade secret and any other intellectual property rights whether or not capable of registration. For the sake of safeguarding the product safety of the Products,

the Buyer shall not modify, alter, translate, reverse engineer, decompile, disassemble or attempt to discover the scientific structure of the Products, or use the Product in an application or environment for which it was not intended or not contemplated to, unless otherwise authorized by Promarine in writing.

12 Cancellation

Promarine may, without affecting its other rights or remedies, terminate any Contract made under these Terms immediately by written notice to the Buyer if:

i. the Buyer becomes subject to bankruptcy, composition, insolvency administration, administrative receivership or other similar proceedings; or
ii. the Buyer is in material breach of these Terms or Contract made under these Terms and fails to cure such breach or present an acceptable plan to cure the breach within thirty (30) days following the written notice from Promarine.

Cancellation or termination by Promarine of any Contract in whole or in part in case of breach of these Terms, or other default of any kind by the Buyer shall entitle Promarine to charge the Buyer for all materials, work and costs (whether direct or indirect) in connection with the orders or deliveries to the Buyer.

13 Disputes

These Terms and all sales contracts and deliveries thereunder shall be governed by, and construed in accordance with the laws of Finland, excluding, however, the Vienna Convention of the International Sales of Goods ("CISG").

Any dispute or controversy arising out of or relating to these Terms, Contracts or deliveries thereunder shall be referred to and determined by arbitration in accordance with the Arbitration Rules of the Finnish Central Chamber of Commerce. The arbitration shall be held in Helsinki, Finland and the arbitration proceedings shall be conducted in English. The arbitral tribunal shall consist of one (1) sole arbitrator, who shall be appointed by the Board of Arbitration of the Central Chamber of Commerce of Finland. Notwithstanding the foregoing Promarine shall, at its discretion, have the right to initiate legal proceedings against the Buyer in any competent court of law for the purposes of collecting any unpaid payments.

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Professional Communication Product Warranty

These warranty terms supplements and does not exclude anything that is stated in the Promarine Ltd's General Terms and Conditions March 2012.

Promarine Ltd. "Promarine" offers one (1) year warranty on all proISO™, proFIL™, proTAC™, proANT™, proGPS™ and proATT™ products unless otherwise specified.

Products returned under this warranty shall be delivered to Promarine at the End User / Business Partner's expense. Upon receipt of such product Promarine may at its sole discretion: refund the purchase price (or a proportionate part of the price), repair or replace any defective unit during the warranty period commencing at the original purchase date. Promarine reserves the right to provide reconditioned replacement product. **Promarine will repair or replace any proISO™ and proTAC™ product that are damaged by lightning during the warranty period**.

Warranty will be void in respect of products which in Promarine's reasonable opinion have been subjected to unauthorised modification or repair, improper installation, neglect, misuse, or operation in environmental conditions outside of specified safe operating extremes. This warranty covers normal use. The warranty does not cover damage incurred during shipment, caused by impact with other objects, dropping, immersion in liquid; service by anyone other than Promarine, use not in accordance with instructions, accident, abuse, misuse, natural disasters such as flood, fire, earthquake or lightning, power surges and problems caused by use of power supplies not supplied by us. Warranty coverage will not apply in the event the serial number or brand-name has been removed, altered or defaced.

The warranty applicable to non Promarine manufactured product supplied by Promarine shall be limited to the warranty offered by the manufacturer of the product.

Please see the "Promarine Ltd's General Terms and Conditions March 2012" for additional terms and conditions.

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About Promarine

Founded in 2005, Promarine Ltd has developed solutions to improve the reliability of navigation and communication systems for different types of marine vessels (military and commercial). With continuous investment in new product development we strive to solve our customers' problems in this field. Promarine's high-quality services and products are designed to overcome problems caused by interference and to prevent it occurring in critical maritime environments. We offer proven solutions trusted by a wide range of naval authorities and marine professionals around Europe.

Our vision

Our vision for interference-free maritime communications guides our efforts in solving communication system problems by listening to customers, continuously learning about new problems and adapting our product and service portfolio to the new requirements.

Our team

Headed by Mr. Jani Järvinen, CEO and founder, Promarine employs a small team of skilled and enthusiastic professionals with over 100 years of combined experience in maritime business and communication system industry.

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POLIZEI
Basilea II
POLIZEI


SAR


SAR
SAR
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RS


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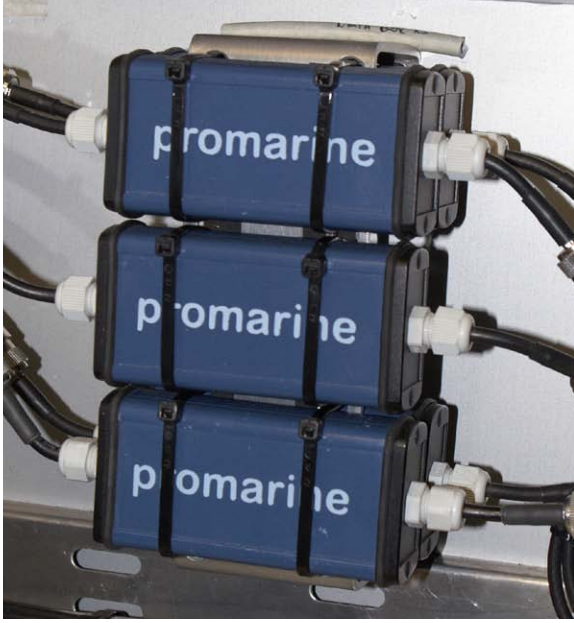
UHF
450-470MHz
VHF
155-170MHz
ANT
FM
88-108MHz
TETRA
380-420MHz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GPS out 2
GPS out 3
GPS out 4


VHF 2
VHF 1
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VHF
155-170MHz
ProFIL4401 (no.1)
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Issue 4.2

Le spécialiste des équipements électroniques

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