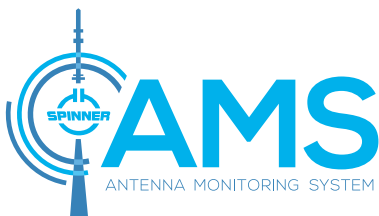


SPINNER Antenna Monitoring System

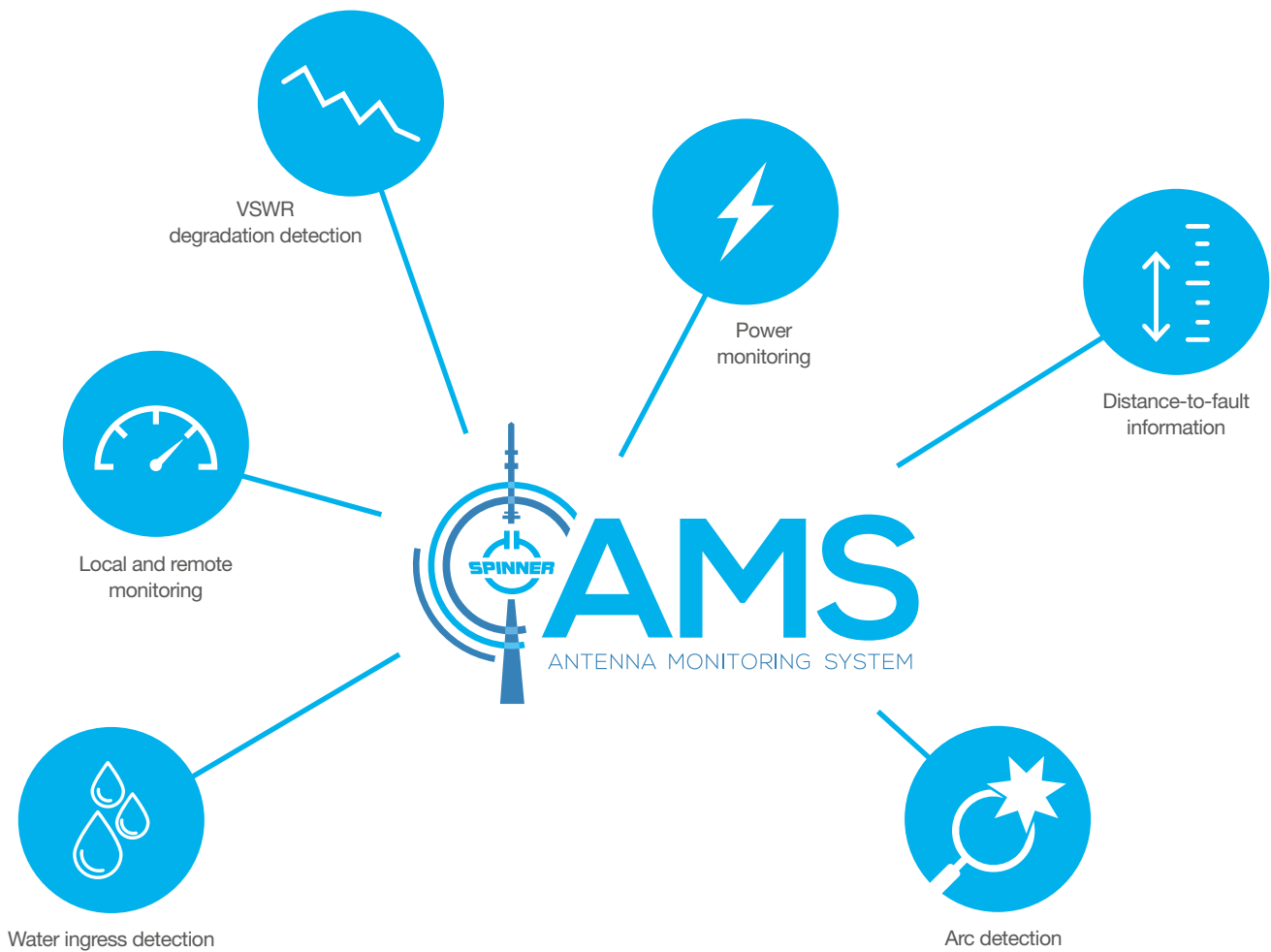


Protect Your Infrastructure

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SPINNER Antenna Monitoring System



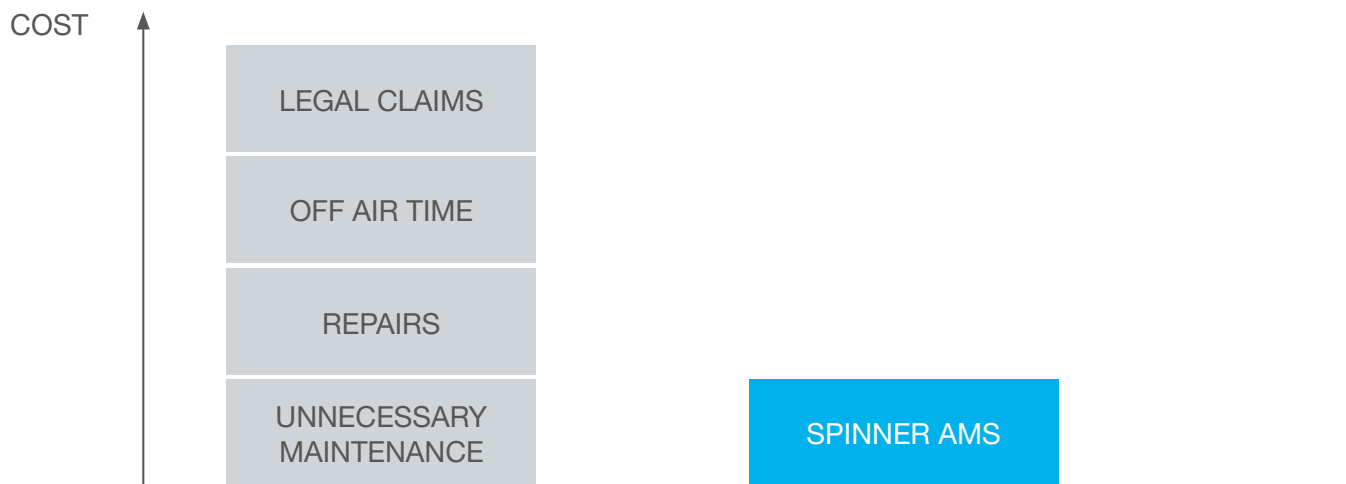
Features & Benefits

- ✓ Fault detection, as arcing and water ingress
- ✓ Distance-to-fault information
- ✓ Optional power monitoring add-on
- ✓ Remote monitoring via SNMP and web interface
- ✓ Local signaling via LEDs and status relays
- ✓ Protection by integration in interlock loop
- ✓ Detection in antennas up to 750 m / 2460 ft.
- ✓ Compact design
- ✓ Fast and easy installation
- ✓ All components indoors
- ✓ No signal injected into antenna line
- ✓ Suitable for pressurized lines
- ✓ 4 digital inputs for any use, e.g. pressure sensors

SPINNER Antenna Monitoring System

The SPINNER Antenna Monitoring System (AMS) protects the broadcasting infrastructure by continuously monitoring the entire antenna system and detecting faults at an early stage, such as arcing or water ingress. It informs you about them as well as their location in order to prevent a severe failure.

The SPINNER AMS Gives You Enormous Value for the Money



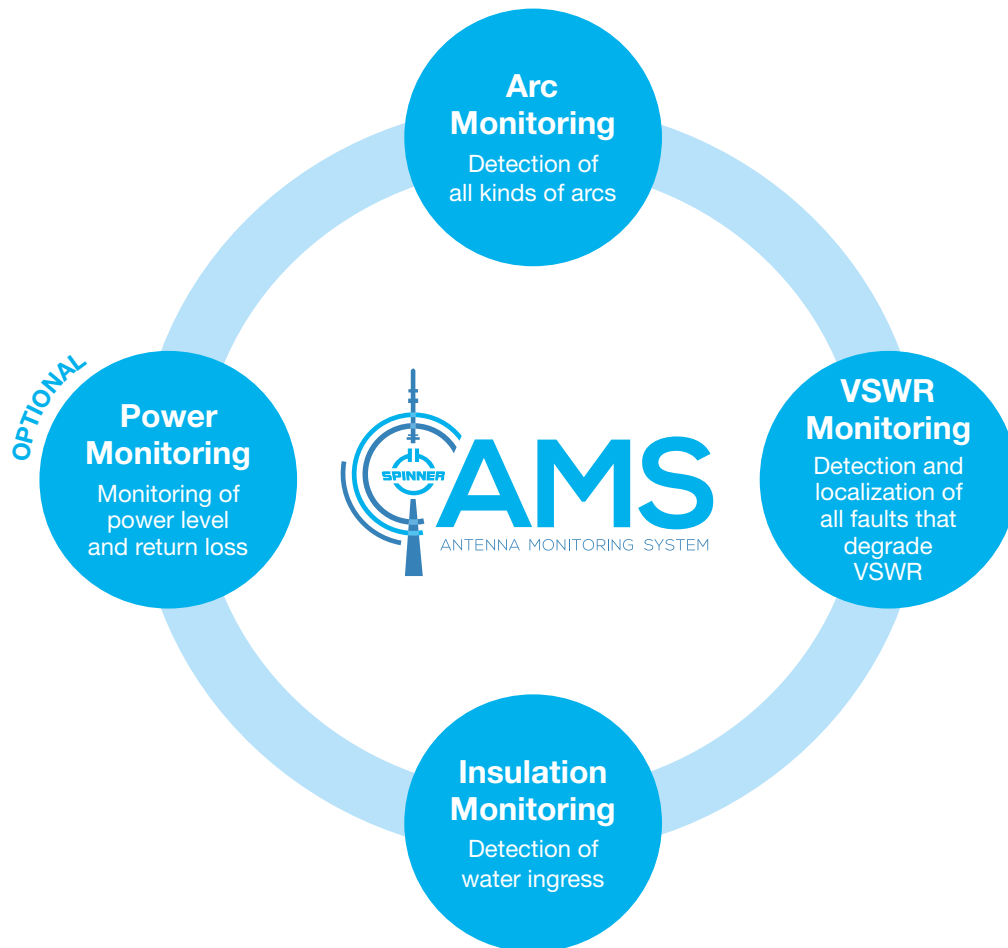
Radio and television broadcasters worldwide rely on their systems to deliver content to listeners and viewers. Although their infrastructure may be robust, it can still be vulnerable. Arcing or water ingress can occur for various reasons such as damaged components by bad weather or long-term use, improper installation, RF overloads, or even unexpected events.

The heat generated by the arc can damage the infrastructure or even lead to fire, thus completely disabling the broadcast system. The resulting long off-air times and financial losses incurred by repairs and legal claims are often substantial. Operators therefore need a reliable early failure detection system to prevent serious damage. The SPINNER Antenna Monitoring System (AMS) can help with this.



How does the detection work?

The AMS uses three different measurement methods complementing each other to reliably detect any fault in the antenna system. All of them are completely passive solution with no additional signal being injected into the antenna line.



The first measurement method is based on monitoring the VSWR of the system and comparing with a recorded reference measurement of the system during normal operation. Any fault that causes VSWR degradation is detected and reported, even small ones that won't immediately deteriorate system performance and cause damage.

The second method detects the signal generated by an arc and analyzes its power level and duration. If the arc is above the limits defined by the user, an alarm is triggered. Since this method is not based on VSWR, even matched arcs¹ are detected.

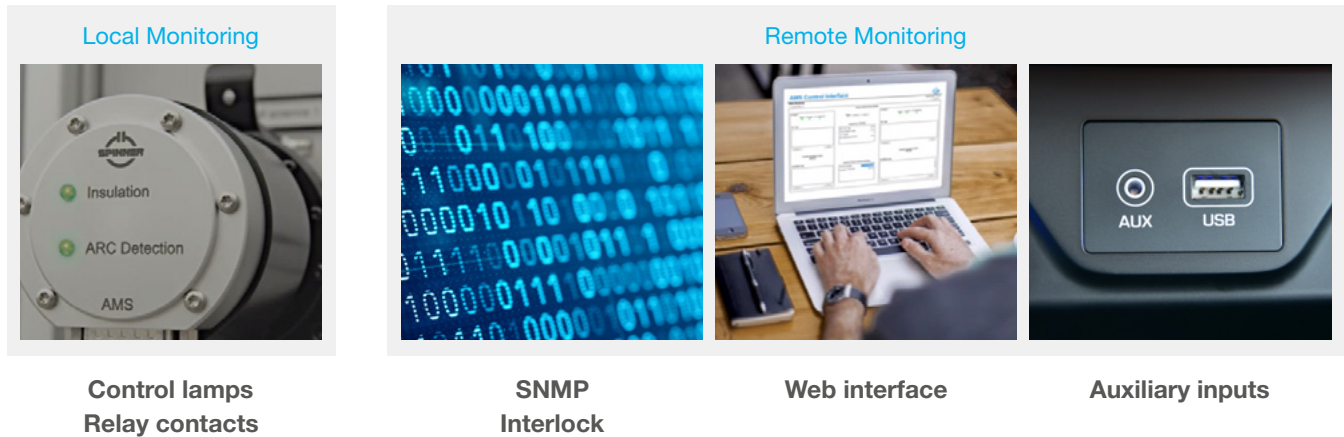
The third method detects water ingress by continuously monitoring the system's impedance. In presence of water the impedance of the system decreases. If the impedance decreases below a defined threshold, this triggers a warning signal.

The AMS can detect and locate any fault longer than 100 μ s with a distance accuracy of 5 meters, regardless of the antenna's height.

¹ Matched arcs are arcs that don't degrade the VSWR significantly to be detectable by a continuous VSWR monitoring .

Interfaces

If a fault is detected, you are informed not only locally by LED lamps, but also remotely via SNMP and a user-friendly web interface. Optionally, you can also connect the AMS to the interlock loop of your transmitter, switching it off in the event of an alarm to protect the infrastructure.



The AMS provides four digital inputs for any use, for example temperature or pressure sensors. You can define the signals' on and off states. Then you can monitor the states of every input at the GUI; changes in state are logged and sent as SNMP traps.

The AMS has a powerful web-based graphical user interface (GUI). In addition to letting you access log files, the GUI provides all the tools you need to analyze faults in your system. They include arc diagnosis that shows all events, that could be potentially an arc, including ones that won't necessarily trigger an alarm.

You can also plot the performance of the antenna system during a time window, showing all information on all faults that degraded the VSWR. It also shows the distance to each fault to help you quickly fix it, thus saving both time and money.



Screenshots of Dashboard and Distance to Fault Monitoring

Components



The SPINNER AMS has an ingeniously simple design, with easy and fast installation. All the components are housed indoors. There are no invasive changes to the system. The system is composed by the following components:

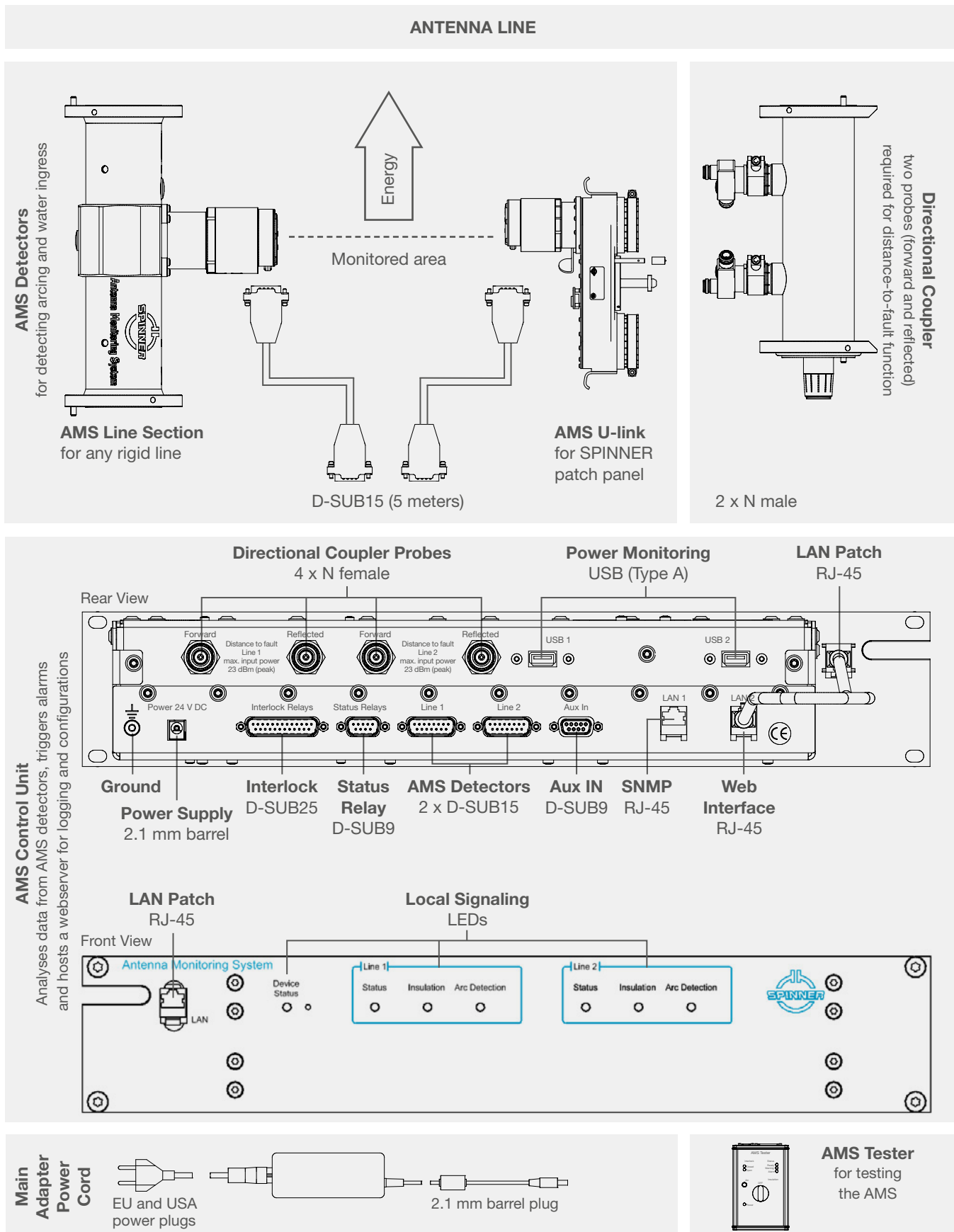
One or more AMS detectors, which are available as U-Links (for SPINNER patch panels) or as line sections (for mounting in any rigid line run). They are responsible for detecting arcing and water ingress. One AMS detector is required for each antenna line.

A directional coupler for each line for monitoring the system's VSWR.

The AMS control unit, which collects and analyzes data from AMS detectors and directional couplers. When thresholds are exceeded, it triggers warnings and alarms via relay contacts and SNMP. It also hosts a web server for remote monitoring and configuration of the AMS system. One AMS control unit can be connected to up to two AMS detectors.

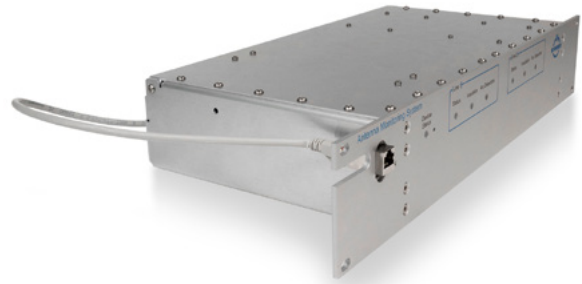
An AMS tester, which simulates arc and water ingress and is used to test the Antenna Monitoring System. The interlock system can also be tested.

Schematic



AMS Control Unit

The AMS control unit collects and analyzes data from AMS detectors and directional couplers. When thresholds are exceeded, it triggers warnings and alarms via relay contacts and SNMP. It also hosts a web server for convenient configuration of the AMS system.



General Data

Broadcasting standards	FM, DAB, ATSC 1.0, ATSC 3.0, DVB-T/T2, ISDB-Tb
Arc detection, min.	100 µs
Distance-to-fault accuracy	± 5 meters
Emission	No signal injected into antenna line
Size of non-volatile memory, min.	10 years of logging at one record per hour

Mechanical Data

Material and surface	Aluminum alloy
Dimensions (L x W x H), mm	158 x 483 x 88 (19", 2RU)
Weight	2.5 kg
IP class	IP40 per EN 60529
MTBF	220,000 h (@ 40 °C ambient temperature)

Electrical Data

Main adapter interface	Power cords for USA, EU and UK (available on request)
Line adapter voltage	80 VAC to 264 VAC, 47 to 63 Hz, 113 VDC to 370 VDC
Power consumption, max	40 W

Interfaces

AMS detectors	2 x D-SUB 15
Interlock	D-SUB 25 plug 10 potential-free relay contacts, open active, max. 42.4 V ACpk / 60 V DC, 0.5 A, SELV
Relay status	D-SUB 9 plug 3 potential-free relay contacts, open active, max. 42.4 V ACpk / 60 V DC, 0.5 A, SELV
Auxiliary inputs	D-SUB 9 socket 4 digital inputs, electrically isolated, potential-free 8 V DC to 28 V DC, any polarity, high active
SNMP (LAN1)	RJ-45 (LAN1 or LAN2 can be patched to front panel) SNMPv2c, based on IRT recommendations
Web interface (LAN2)	RJ-45 (LAN1 or LAN2 can be patched to front panel) IE 9 or higher, Firefox
Local signalization	LEDs on front panel and AMS detectors
Directional coupler probes for distance-to-fault function	4 x N female (50 Ohms)
Power monitoring add-on	USB (type A)

AMS Line Section

The AMS detector integrated in a line section can be mounted in any rigid line run.



General Information

Material and surface	Aluminum alloy, painted
IP class	IP 50 per EN 60529
Interface	D-SUB 15-socket

Band II

Size	1 5/8" EIA	3 1/8" EIA	4 1/2" EIA	6 1/8" EIA	7 3/16" ¹	8 3/16" ¹	9 3/16" ¹
Impedance	50 Ω	50 Ω	50 Ω	50 Ω	75 Ω	75 Ω	50 Ω
Test voltage	7 kV	16 kV	18 kV	22 kV	22 kV	24 kV	24 kV
Avg. power (at 108 MHz)	20 kW	67 kW	127 kW	140 kW	202 kW	256 kW	360 kW
VSWR	1.06						
Dimensions (LxWxH), mm	310x120x300	355x130x215	360x160x260	480x210x305	515x245x415	544x280x435	535x310x390
Weight	7.5 kg	4.5 kg	6.5 kg	12 kg	18 kg	22 kg	27 kg

Band III

Size	3 1/8" EIA	4 1/2" EIA	6 1/8" EIA	7 3/16" ¹	8 3/16" ¹
Impedance	50 Ω	50 Ω	50 Ω	75 Ω	75 Ω
Test voltage	14 kV	18 kV	22 kV	34 kV	38 kV
Avg. power (at 254 MHz)	44 kW	64 kW	100 kW	132 kW	167 kW
VSWR	1.06				
Dimensions (LxWxH), mm	335x130x236	360x160x235	460x210x270	515x245x325	565x280x345
Weight	5 kg	6.5 kg	12 kg	18 kg	22 kg

Band IV / V

Size	1 5/8" EIA	3 1/8" EIA	4 1/2" EIA	6 1/8" EIA	7 3/16" ¹	8 3/16" ¹
Impedance	50 Ω	50 Ω	50 Ω	50 Ω	75 Ω	75 Ω
Test voltage	7 kV	16 kV	22 kV	22 kV	30 kV	34 kV
Avg. power (at 800 MHz)	7 kW	20 kW	40 kW	65 kW	77 kW ²	101 kW ³
VSWR	1.06					
Dimensions (LxWxH), mm	310x120x300	335x195x200	360x160x250	460x210x290	515x245x355	545x280x375
Weight	7.5 kg	6 kg	9 kg	12 kg	19 kg	20 kg

¹ Can be pressurized up to 0.35 bar (5 psig)

² Avg. power at 746 MHz

³ Avg. power at 698 MHz

AMS U-Link

The AMS detector integrated in a U-link can be mounted on any SPINNER patch panel.



General Information

Interlock types	Interlock 1, interlock 2
Versions	USL-D, USL
Material and surface	Aluminum alloy
IP protection level	IP 50 per EN 60529
Interface	D-SUB 15 socket

Band II

Size	1 5/8"	29.5 - 68	43 - 98
Impedance	50 Ω		
Test voltage	7 kV	13.5 kV	8 kV
Avg. power (at 108 MHz)	20 kW	51 kW	98 kW
VSWR	1.06		
Dimensions (LxWxH), mm	295 x 105 x 205	295 x 105 x 205	395 x 140 x 270
Weight	2.5 kg	2.6 kg	7 kg

Band III

Size	1 5/8"	29.5 - 68
Impedance	50 Ω	
Test voltage	5.5 kV	
Avg. power (at 254 MHz)	13 kW	33 kW
VSWR	1.06 ¹	
Dimensions (LxWxH), mm	295x 105 x 205	295 x 105 x 205
Weight	2.5 kg	2.6 kg

Band IV/V

Size	1 5/8"	29.5 - 68	43 - 98	52 - 120
Impedance	50 Ω			
Test voltage	7 kV	13 kV	19 kV	25 kV
Avg. power (at 800 MHz)	7 kW	17.5 kW	35 kW	60 kW
VSWR	1.06			
Dimensions (LxWxH), mm	295 x 105 x 205	295 x 105x 205	395 x 140 x 258	570 x 180 x 310
Weight	2.5 kg	2.6 kg	7 kg	11.5 kg

¹ 1.09 from 240 MHz to 254 MHz

Part Numbers

The AMS can be only ordered as a kit, consisting of a control unit and one or two AMS detectors.
For spare parts or accessories, please see page 16.

Basic Number							AMS Detector (AMS Line Section or AMS U-Link)				
							Size	Type	Quantity	Version	
5	5	5	X	X	X	C	X	X	X	X	
AMS kit for band II			0	2	2						
AMS kit for band III			0	3	2						
AMS kit for band IV/V			0	4	2						
AMS line section		AMS U-link									
1 5/8" EIA		1 5/8"						1			
3 1/8" EIA		29.5-68						3			
4 1/2" EIA		43-98						4			
6 1/8" EIA		52-120						5			
(reserved for internal use)								6			
7 3/16"								7			
8 3/16"								8			
9 3/16"								9			
AMS U-link - interlock 1									1		
AMS U-link - interlock 2									2		
AMS line section - 50 Ohm									3		
AMS line section - 75 Ohm									4		
No. of AMS detectors (control unit can be connected up to 2 AMS detectors)											
To be completed by SPINNER											

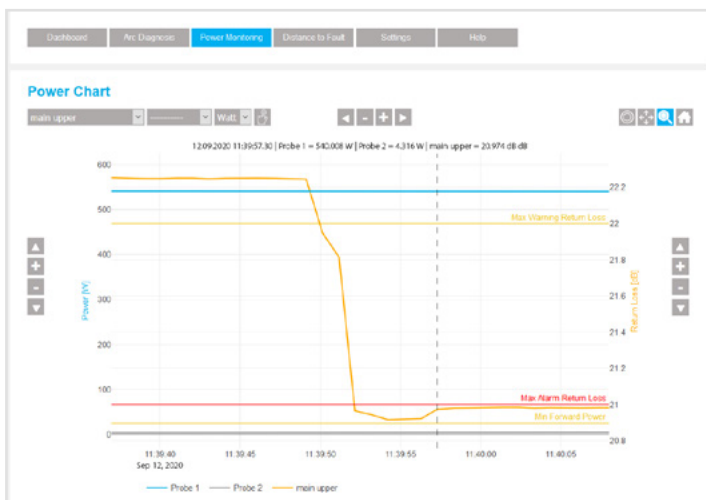
Scope of Delivery

Control unit, line adapter, power cord (EU and USA), AMS detector(s), D-SUB 15 connection cable(s) - 5 m

AMS Power Monitoring Add-On

The AMS power monitoring add-on monitors the power levels and return losses on up to four RF channels (eight RF probes). For each probe and RF channel, different thresholds for warnings and alarms can be individually set.

All of the information is displayed on the web interface. You can check the current value and status of each probe /RF channel on our dashboard or monitor them over time.



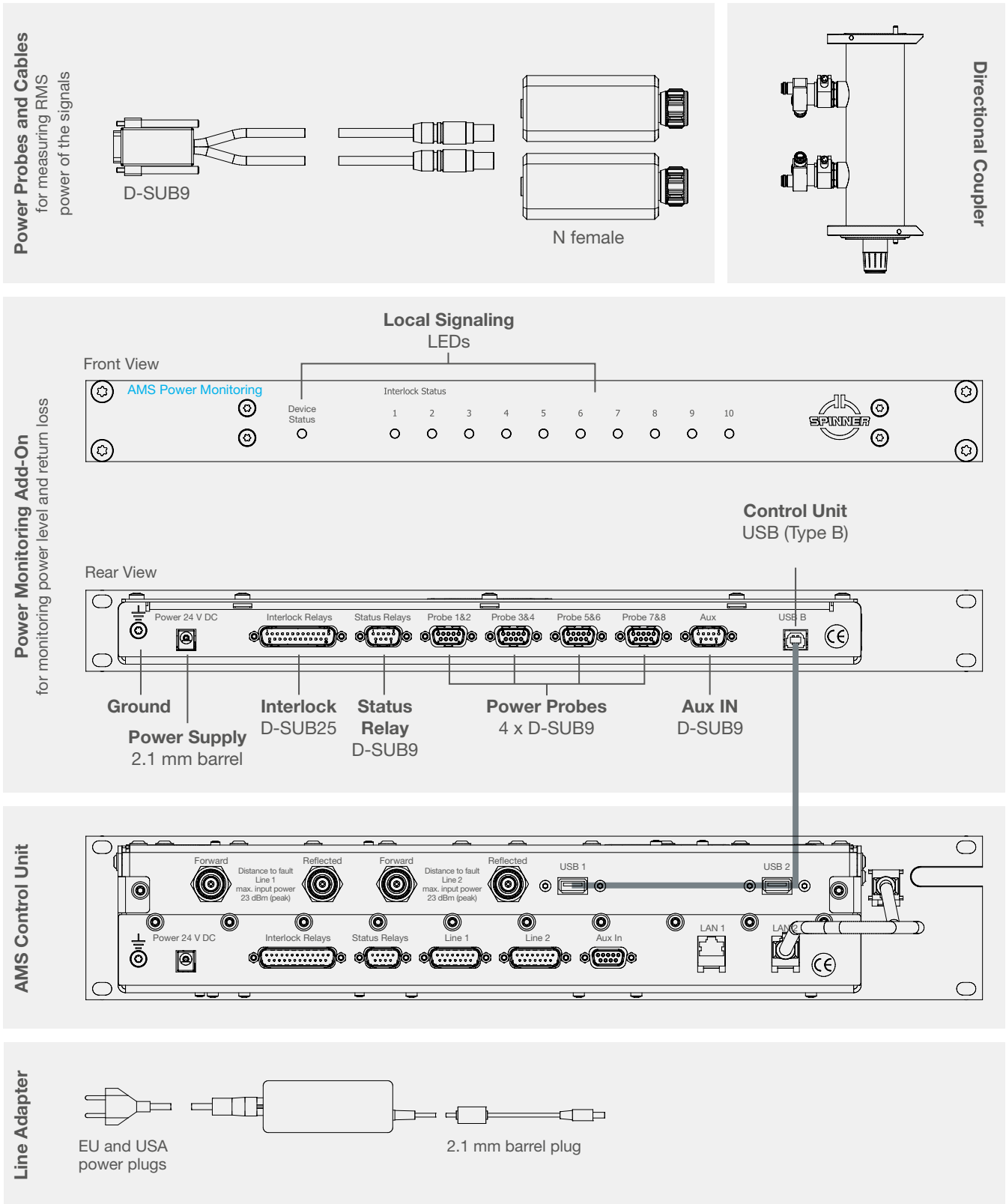
Screenshot of AMS Power Monitoring

All warning and alarm events are logged and also sent via SNMP. 10 potential free interlock loops are also available.

The system is composed by a directional coupler with two probes for each RF channel for measuring the RMS power of the signals. The Power monitor unit monitors the power levels and return loss, while the AMS control unit hosts the webserver.



Schematic



AMS Power Monitoring Unit

The AMS power monitoring unit monitors power levels and return losses on up to four RF channels (eight RF probes). It triggers user-definable warnings and alarms.



General Data

Part number	BN 555050C0000
Frequency range	50 MHz - 860 MHz
RF channels	Up to 4 channels (8 power probes)
Absolute power measurement accuracy	± 2.0 dB
Relative power measurement accuracy	± 0.5 dB
Power correction (over frequency)	-6 dB / octave
Polling rate via SNMP	6 s

Mechanical Data

Dimensions (L x W x H) mm	158 x 483 x 44 mm (19", 1RU)
Weight	1.6 kg
IP class	IP 40 per EN 60529

Electrical Data

Line adapter voltage	80 V AC to 264 V AC, 47 to 63 Hz, 113 V DC to 370 V DC
Line adapter interface	Power cords for USA, EU and UK (on request)
Power consumption, max.	10 W

Interfaces

Interlock	D-SUB 25 plug 10 potential-free relay contacts, open active, max. 42.4 V ACpk / 60 V DC, 0.5 A, SELV
Relay status	D-SUB 9 plug 3 potential-free relay contacts, open active, max. 42.4 V ACpk / 60 V DC, 0.5 A, SELV
Power probes	8 x N female (50 Ohm)
Data interface to AMS control unit	USB type A, USB type B

AMS Power Probes and Cables

AMS power probes and cables measure the RMS signal power.



FM and VHF Probes

Part number	BN 155891
Frequency range	50 MHz - 250 MHz
Power measurement range	-29 dBm to +15 dBm
Coaxial interface connector	1 x N female (50 Ω)
Dimensions (L x W x H) mm	90 x 35.5 x 26
Weight	155 g

UHF Probes

Part number	BN 155892
Frequency range	470 MHz - 860 MHz
Power measurement range	-34 dBm to +10 dBm
Coaxial interface connector	1 x N female (50 Ω)
Dimensions (L x W x H) mm	90 x 35.5 x 26
Weight	155 g

Connecting Cable

Part number	BN A75049	BN A75069	BN A76392
Type	Single cable 1 x Lemo FGG to D-SUB 9 2 metres	Y-cable 2 x Lemo FGG to D-SUB 9 2 metres	Y-cable 2 x Lemo FGG to D-SUB 9 5 metres



Spare Parts and Accessories



AMS tester for testing the AMS functionality	BN 555010
Cable from control unit to AMS detector (length: 5 meters)	BN A75695
Cable from control unit to AMS detector (length: 30 meters)	BN A75696
Line adapter	BN A76170
Power cord - Europe	BN A76167
Power cord - UK	BN A76168
Power cord - North America	BN A76169
Directional couplers	See directional couplers in broadcast catalog.

Environmental Conditions

Operating conditions	ETSI EN 300 019-4-3 V2.3.2 (2009-1) class 3.1 N
Ambient temperature range	-10 °C to +45 °C
Relative humidity, max.	95 % (non-condensing)
De-rating of RF power and voltage with increasing altitude	See "Environmental Conditions for Broadcast Products" TD-00060.
Transport conditions	ETSI EN 300 019-1-2 V2.1.4 (2009-1) class 2.2
Ambient temperature range	-25 °C to +70 °C
Rain, condensation, icing	Not allowed
Storage conditions	ETSI EN 300 019-1-1 V2.1.4 (2009-1) class 1.2
Ambient temperature range	-10 °C to +45 °C
Rain, condensation, icing	Not allowed
Safety	EN 60125 (1994) / IEC 215 (1993)

Applicable Documents

Product manual AMS incl. AMS power monitoring	M36557
Product manual AMS tester	M36274





HIGH FREQUENCY PERFORMANCE WORLDWIDE

SPINNER designs and builds cutting-edge radio frequency systems, setting performance and longevity standards for others to follow. The company's track record of innovation dates back to 1946, and many of today's mainstream products are rooted in SPINNER inventions.

Industry leaders continue to count on SPINNER's engineering excellence to drive down their costs of service and ownership with premium-quality, off-the-shelf products and custom solutions. Headquartered in Munich, Germany, the global frontrunner in RF components remains the first choice in simple-yet-smart RF solutions.

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