HF1830S-S

Fast Tuning HF Antenna System

Technical Description

This HF1830S-S is a versatile fast tuning HF antenna system for use on submarines or surface vessels. The compact design with telescopic radiating element means it's particularly suited to serve as back-up for the regular HF-antenna in the case of failure. It can also serve as emergency antenna for GMDSS operation in case the regular antenna system is inoperable. The antenna is supplied in a protective packing case for stowing when not in use.

Electrical Specification

Type	Tunable whip antenna
Purpose	HF sky-wave/groundwave communication. Emergency operation (GMDSS).
Frequency Range	1.8-30 MHz
Impedance	50 Ohm
VSWR	Within the tuned bandwidth <3.0:1 on the tuned frequency < 2.5:1 (slightly dependent on installation)
Scanning Mode	Wideband mode for scan operations
Narrowband Bandwidth	≥3.0 kHz tuned at frequencies below 3 MHz ≥6.0 kHz tuned at frequencies at and above 3 MHz
RF-power	500 W of input power (PEP or average power) continuously for up to 30 min
Gain	-10 – 2 dBi, depending on installation and surrounding environment.
Radiation Pattern	Similar to a quarter wave monopole
Polarization	Linearly polarized
Tuning	Manual tuning based on fq. Input in GUI/HMI. Automatic tuning based on frequency counting on the carrier. Automatic tuning based on radio interface (optional)
Tuning Time	< 100 ms, fast tuning <10 ms
Antenna Tuning Modes	RF-Sense (Frequency counter) Fast tuning <10ms via serial port
Calibration	Automatic
Antenna element	Manually erected telescopic whip.
Power Supply	24V, 1A
Connectors	N connector for RF-connection MIL-DTL-38999 for data transfer Shell size 3 for the RF Shell size 0 for power/RS485
Remote Control	RS-485

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Mechanical Specification

Size	Ø220mm ~1.5m length retracted ~3.9m length extended
Weight	Antenna: ~21kg, Storage Bag: ~4kg

Standards

MIL-STD-188-141B	Interoperability and Performance standards for Medium and High Frequency Radio Systems
MIL-STD-461F	Requirements for the Control of Electromagnetic Interference Emissions and Susceptibility
MIL-STD-810F	Environmental Test Methods and Engineering Guidelines
MIL-STD-1472F	Human engineering

General Operation

The HF1830S-S comprises the following three components -

1. Tunable antenna - Comprises the whip antenna element, Antenna Control Unit (ACU) and Antenna Tuning Unit (ATU)

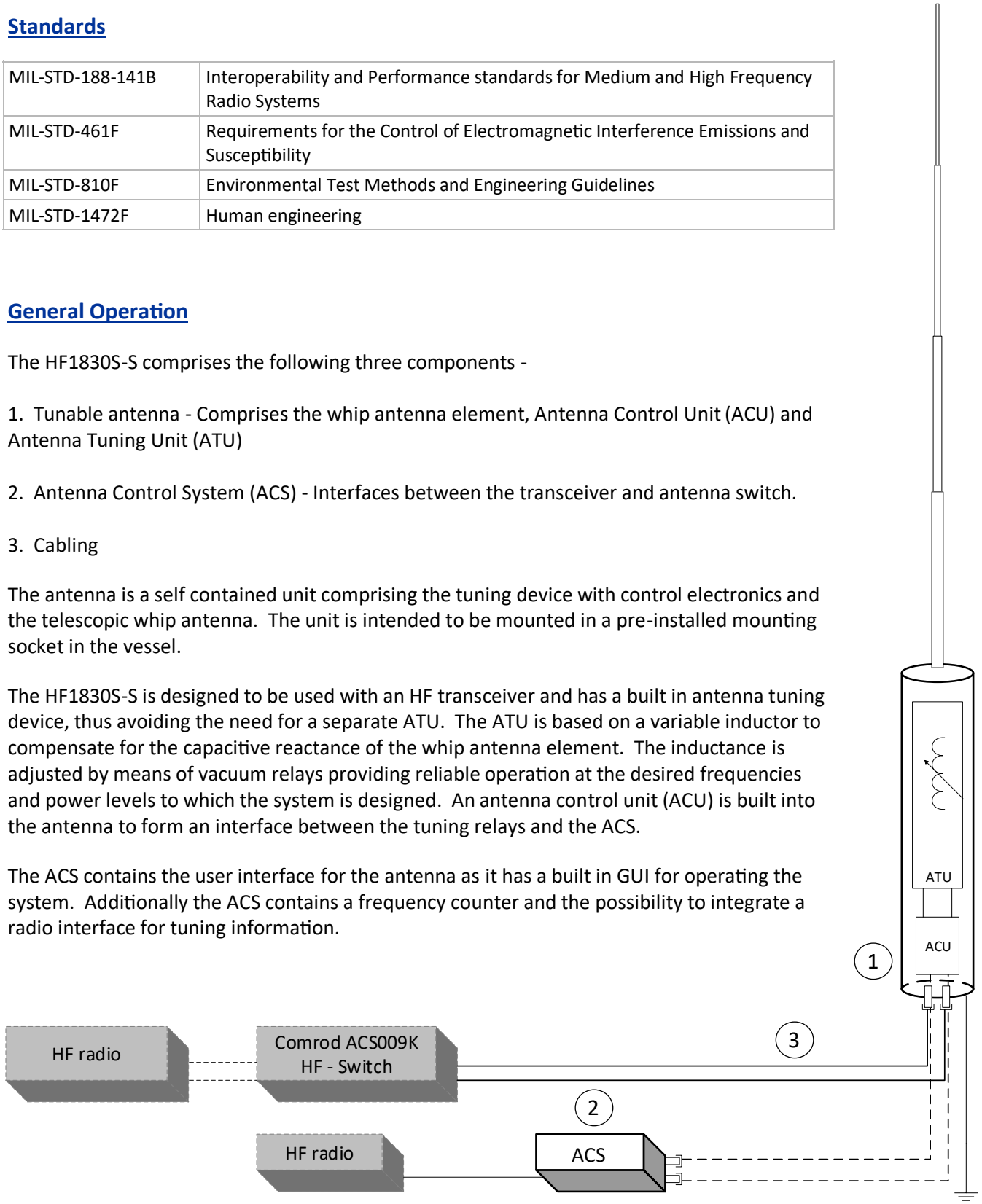
2. Antenna Control System (ACS) - Interfaces between the transceiver and antenna switch.

3. Cabling

The antenna is a self contained unit comprising the tuning device with control electronics and the telescopic whip antenna. The unit is intended to be mounted in a pre-installed mounting socket in the vessel.

The HF1830S-S is designed to be used with an HF transceiver and has a built in antenna tuning device, thus avoiding the need for a separate ATU. The ATU is based on a variable inductor to compensate for the capacitive reactance of the whip antenna element. The inductance is adjusted by means of vacuum relays providing reliable operation at the desired frequencies and power levels to which the system is designed. An antenna control unit (ACU) is built into the antenna to form an interface between the tuning relays and the ACS.

The ACS contains the user interface for the antenna as it has a built in GUI for operating the system. Additionally the ACS contains a frequency counter and the possibility to integrate a radio interface for tuning information.



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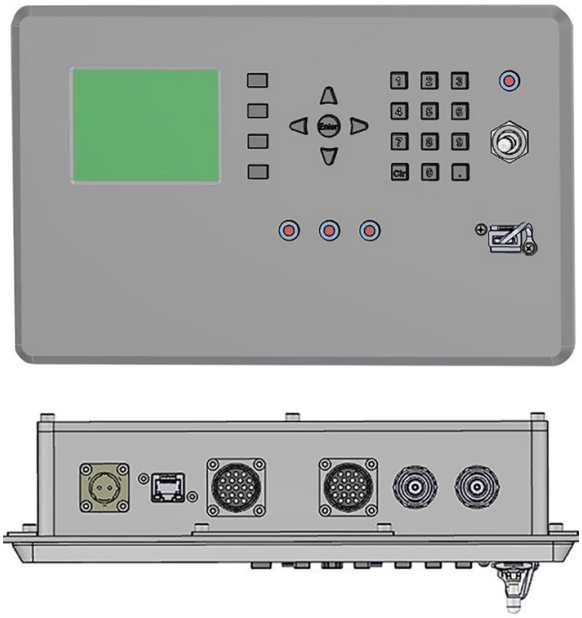
Antenna Control Systems, ACS

Several Antenna Control Systems (ACS) can be used with the spare antenna. Besides the advanced ACS009 5-way HF-switch, the ACS010 can be used. The ACS010 comes in two versions; the panel mounted ACS010P, and the rack mounted ACS010R. The functions of the both ACS version are identical. The ACS010P and ACS010R contain some of the managerial functions of the HF-switch such as those for handling tuning tables. The ACS010P and the ACS010R are built in a metal shielding box containing:

- Power supply for the antenna
- Custom control electronics; MCU-board with plug-in I/O units.
- Directional coupler for additional fwd /rev power monitoring and fq-counting.

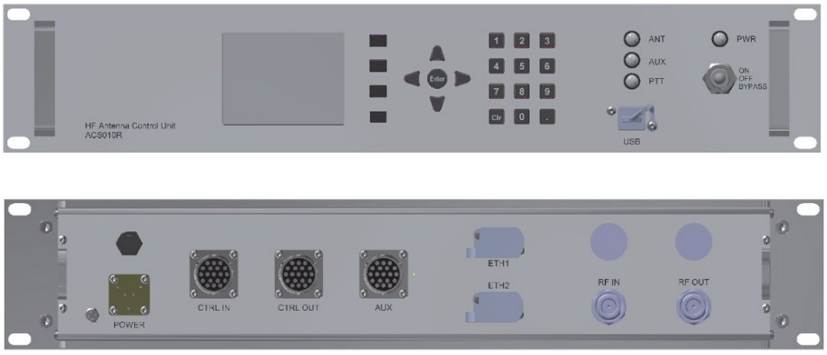
ACS010P

285(265) x 185(165) x 100 mm
11”2(10”4) x 7”3 (6”5) x 3”9 inch



ACS010R

483 x 89 x 310 mm
19” x 3”5 x 12”2 inch



ACS Functionality

The ACS010P and ACS010R provides the power supply to the antenna assembly, is protected against reversed polarity and is isolated from ground. The main functions of the different ACS-models (ACS010P /ACS010R and the ACS0nx) are described in the following sections. The two models ACS010P /ACS010R have the same functionality but have different height, one is rack mounted and one is panel mounted. Functions within () are optional features for the respective model.

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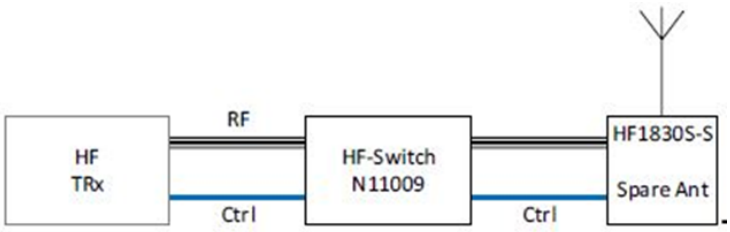
Typical System Configurations

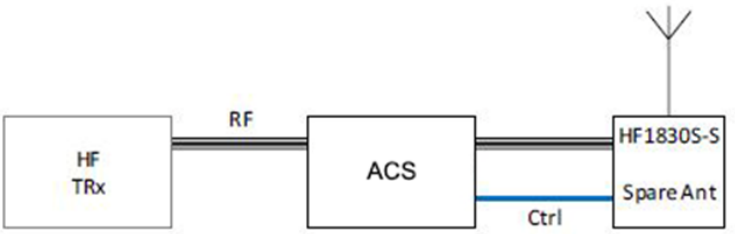
HF-switch Integration

The antenna is compatible with the existing HF-switch and is connected directly to the existing switch, just as the regular antenna. Power is fed from the HF-switch.



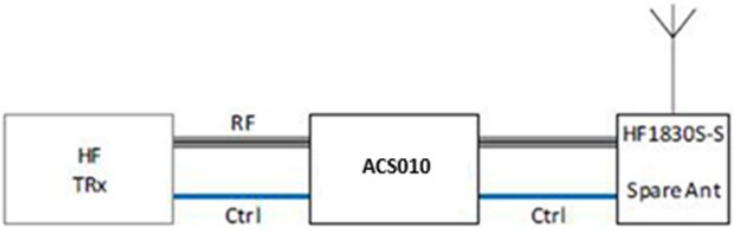
HF Spare Antenna System

The HF spare antenna is controlled by the ACU and is monitored in the ACS. Tuning by manual entry or frequency sense for the ACS010P and the ACS010R.



Standalone System – Radio Integrated

The HF spare antenna is controlled by the ACS which also does monitoring. Both tuning by manual frequency entry or tuning by frequency sense are possible for the ACS010P and the ACS010R. The ACS010P and the ACS010R support a “3G-ALE” mode using frequency-counting for tuning the antenna and reverting to a Wideband RX-mode after a pre-set time -out. Tuning by Radio control interfaces, the ACS010P and the ACS010R allows one radio interface connected at a time (optional and only for only supported radio equipment) allows two radio interfaces and RF-switching between the radios. The HF spare antenna power is fed from the ACS.



Regular Antenna – Spare Control

The regular antenna is connected to the ACS (if the HF -switch is rendered unusable). Tuning by manual frequency entry and tuning by frequency sense is possible for the ACS010P and the ACS010R. The ACS010P and the ACS010R supports a 3G-ALE mode using frequency-counting for tuning the antenna and reverting to a Wideband RX-mode after a pre-set time-out. Tuning by Radio control interface, multiple radio types as well as switching between two radios is possible. The HF spare antenna power is fed from the ACS.

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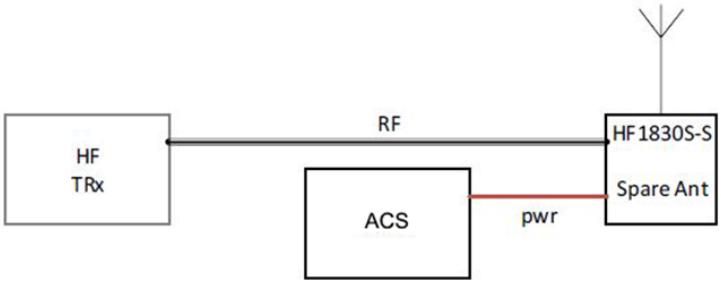
Typical System Configurations

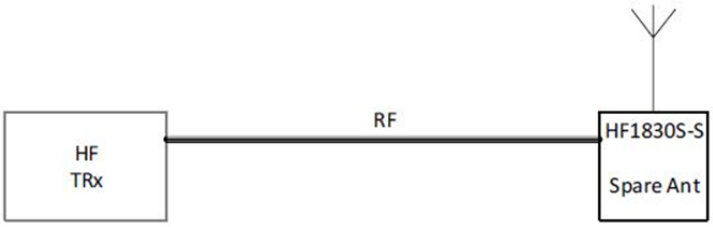
Standalone Antenna, with Power

Also called autonomous mode. The antenna is self contained and the ACU is working in standalone mode. Tuning is based on fq-sense in the antenna, using the default tuning table (one available). Power is fed through the ACS by a separate hard wired connection.



Standalone Antenna, Emergency Mode

The antenna is passive and does not need power. Default tuning for 2187.5 kHz (GMDSS MF DSC).



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