

Selection Guide for Simple to Install Super Rugged Antennas (SRA) Highest number of event-free, locomotive hours since introduction in 2008

Quoted on Request

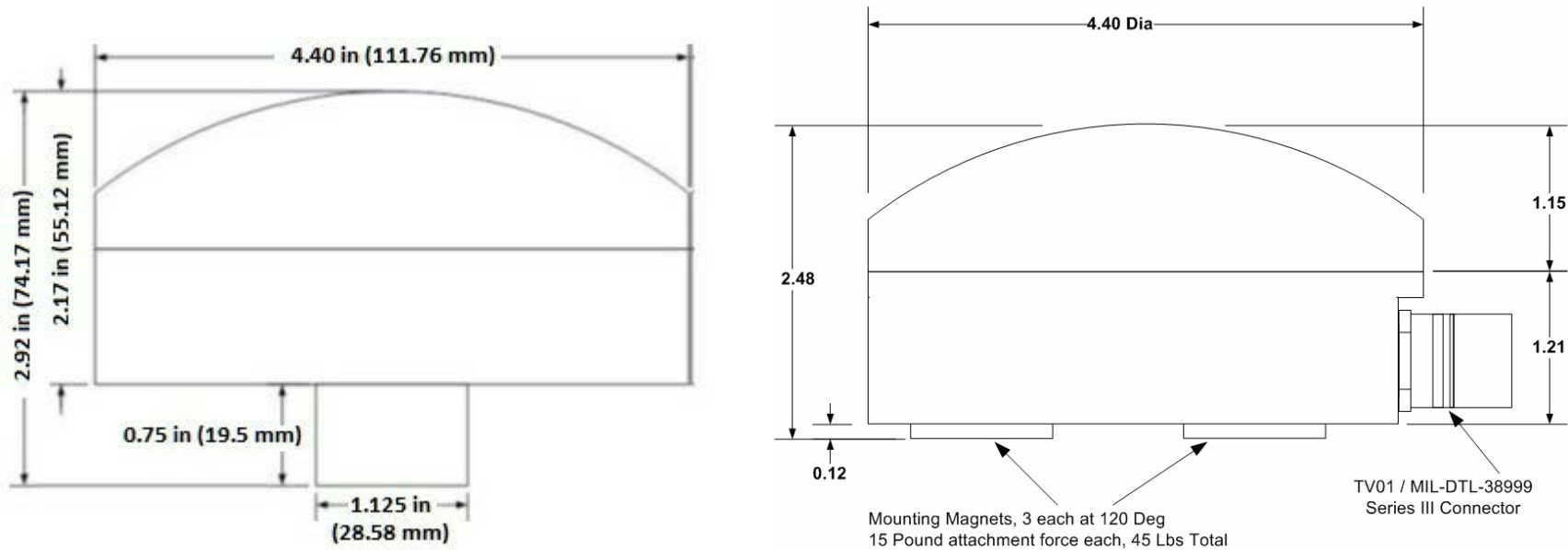
Model	SRA-5H	SRA-6H	SRA-6Tf	SRA-M8T	SRA-F9K	Comment	Accuracy	Comments
P/N RS-232	110111111G	110111111G	11011182	11011374	11015582G	Simple Interface		
P/N RS-422	11011000G Special Order	11011000G Special Order	11011022	11011372	11015584G	Best for high electrical noise environments		
GPS Only	50 channels GPS, Galileo L1 C/A SBAS, WAAS, EGNOS	50 channels GPS, Galileo, GLONASS, L1 C/A SBAS, WAAS, EGNOS, MSAS	50 channels L1 C/A SBAS: WAAS, EGNOS, MSAS			RTCM -2 GPxx message format	Autonomous – 2.5 m CEP SBAS – 2.0 m CEP RTCM – 2.0 m RTK < 20 cm + 1 ppm CEP (See u-Blox LEA-6T datasheet)	Lowest cost, Ruggedized position, velocity, and timing SRA
Multi Constellati on	N/A	N/A	N/A	72 channels GPS/QZSS L1 C/A, GLONASS L10F, BeiDou B1 SBAS L1 C/A: WAAS, EGNOS, MSAS, GAGAN Galileo E1B/C		RTCM – 2 GPxx Message for GPS RTCM -3 GNxx message format for mixed GNSS	Autonomous – 2.5 m CEP RTCM – 2.0 meters RTK < 20 cm + 1 ppm CEP (See u-Blox LEA-M8T datasheet) SwiftNav\Skylark <10 cm	Best choice for geographic areas with limited sky visibility where additional satellites are required for reliable positioning.
Multi GNSS and Multi Band	N/A	N/A	N/A		184 channels GPS L1C/A L2C, GLO L10F L20F, GAL E1B/C E5b, BDS B1I B2I, QZSS L1C/A L2C	RTCM -3 GNxx message format for mixed GNSS	L1 Autonomous – 2.5 m CEP L1/L2 Autonomous – 2.0 m CEP RTCM – 2.0 meters RTK < 20 cm + 1 ppm CEP (See u-Blox ZED-F9 datasheet) SwiftNav\Skylark <10 cm	Best autonomous accuracy without a reference station and areas with limited sky visibility. Dead-reckoning for position reference through tunnels and other GPS\GNSS denied situations

Common SRA features include: Fast, one-hour, through-hole installation; Machined Aluminum electronics housing; Rugged, non-ABS plastic, HDPE Radome rated for 40 years of high temperature, high U/V exposure; < 15 ns 1PPS for high precision, system timing reference; Robust power line filtering to eliminate damage due to high voltage power-line transients; Certified for operation in high shock and vibrations environments where other products fail; Ultra-fast TTFF; Declaration of conformity includes FCC, Industry Canada, CE, Radio Equipment Directive (RED) AREMA and many others. Specify interface cable length and standard insulation or No-Smoke interface cables.

SRA Mounting Considerations – All versions

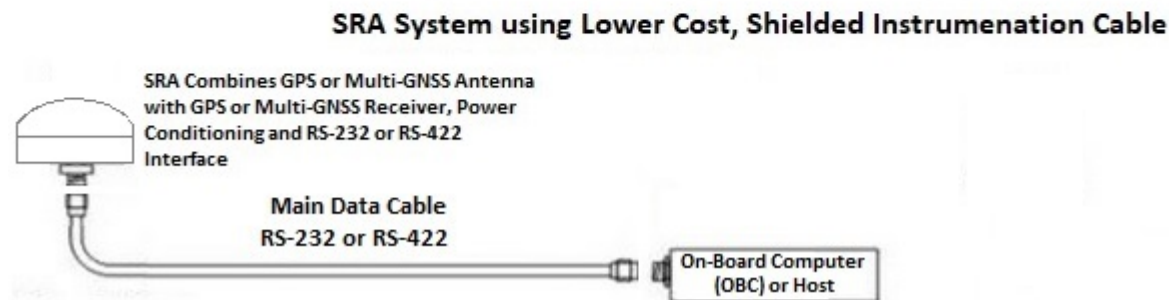
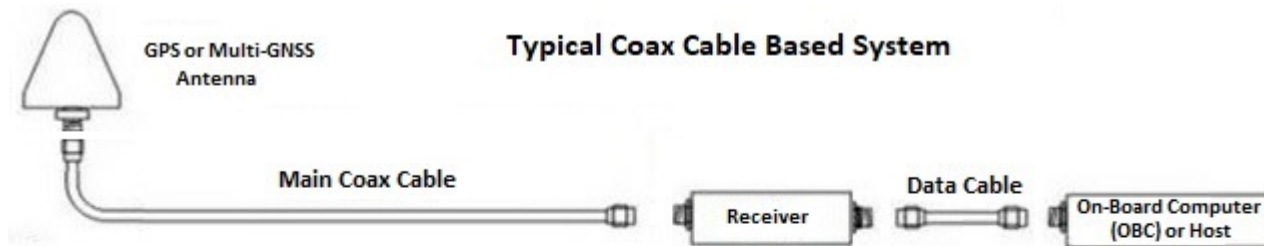
In general, the SRA should be positioned so that it has an unobstructed view of the sky and away from Electro-Magnetic Interference (EMI) radiators. Although the SRA employs filtered GPS and Multi-GNSS antenna modules, it is always best to locate the SRA away from other potential sources of interference like radio antennas, etc. The separation distance depends on the power and frequency of the potentially interfering devices including other GPS and Multi-GNSS receiver antennas.

In all cases Synergy recommends the SRA be placed temporarily in the desired mounting area and tested while the radios, or other interference sources, are operating. The goal is for full GPS\GNSS operation without any pauses in reception that would create false position message data flow. There are many types of locomotives in use today and the optimum mounting locations can be different from one locomotive to another. To locate an optimum SRA mounting position, Synergy has developed a solution that makes finding the best mounting location much easier. That product is a Magnetic Mount version of the SRA. It can be used to test for an optimum mounting location, for the through-hole version, prior to mounting the SRA through-hole version permanently:



SRA installation compared to traditional GPS\Multi-GNSS receiver installation

GPS\Multi-GNSS receiver installations using coax cable interconnections typically require more time and labor cost for installation and on-going maintenance. The individual parts comprising a coax based receiving system also cost more initially than an SRA based system, with comparable performance specifications.



SRA based GPS\GNSS receiver systems are simple and allow for faster installations. The data cables are easier to install and are not subject to GPS\GNSS signal loss as with traditional coax cable based systems. A major advantage of installing SRA products is providing higher performance positioning upgrades as future technology becomes available. For example, SRA-5H and SRA-6Tf products already in the field can be upgraded to the new Multi-GNSS\Multi-Band SRA-F9K to achieve dead-reckoning position in tunnels and accuracies, that until now, required way-side or satellite correction services to provide similar performance. Upgrading the OBC\Host computer to recognize additional satellite constellations (Multi-GNSS) provides much better positioning in areas with poor sky visibility.