SRS Tech Note

GNSS Antennas for SRS Timing Products

Customers may choose to purchase a GNSS antenna from SRS, or a third party, or use an existing GNSS antenna at their facility. SRS timing receivers require a net gain (after cable losses) of +20 dBi to +32 dBi, which is a very common level from a variety of available active antennas and typical cable lengths. The antenna input to SRS timing receivers have a female BNC connector, provide +5 V bias, and have a 50 Ω input impedance.

SRS offers two antenna solutions, both of which have LNAs. All systems components have a 50 Ω characteristic impedance.

O740ANT1 *GPS antenna for SR740 and FS752 (for indoor use)*

GPS Indoor Antenna

The O740ANT1 antenna is a complete, low cost design for light duty applications (typically indoors, through windows or skylights, but never where there is a lightning risk). This antenna has 30 dBi of gain and a 25' RG-58/U coax lead with a male BNC connector. This antenna is for GPS only and connects directly to the SRS timing receiver. The antenna includes a marine style nylon ratchet mount which may be used as a stand, or used for permanent mounting of the antenna to vertical, horizontal or slanted surfaces.

O740ANT2 *GPS/GNSS antenna with mounting kit for SR740 and FS752 (for outdoor use)*

The second antenna solution (O740ANT2) consists of components for the construction of a robust GPS/GLONASS antenna system. The kit includes a Trimble Bullet III GNSS omnidirectional antenna with LNA, a mounting kit (for wall, pole, shelf, cabinet or magnetic mounting), a lightning surge arrestor, 100' of 10 AWG copper wire for lightning grounding, 25' and 50' of low loss, 0.195" diameter, 50 Ω TNC extension cables (male-female, *not* RP), and a TNC to BNC adapter to connect to the SRS GNSS receiver and an assortment of hardware to assist with installation.

The +32 dBi gain antenna will provide a +20 dBi signal to the receiver, even with 12 dB of cable losses. For installations which require more than 75' of cable, it will be necessary to use 0.400" low loss cables which may be ordered from third party vendors. The 0.400" cables allow cable lengths up to 200'.

GPS Outdoor Antenna Kit

Additional cables and inline GPS amplifiers are available from third party vendors if the antenna is more than 200' from the receiver.

There are many considerations for the design of an outdoor GNSS antenna, including:

1. An unobstructed view of the sky. If obstructions are unavoidable, a clear view of the southern sky is preferred. Also, avoid antenna placement with multipath opportunities (reflections from other structures).
2. Use of cable types and lengths with less than 12 dB of loss at 1.6 GHz between the antenna and the timing receiver.
3. Sufficient height so that the antenna will not be buried by more than 1 foot of snow.
4. Strategies to avoid lightning strikes. Avoid being the highest metal object (which, unfortunately, conflicts with a clear sky view and avoiding multipath).
5. A strategy to handle a lightning strike. This is a complicated and important topic which must be addressed to insure the safety of personnel and reduce equipment damage. The antenna mast

and inline lightning surge arrestor, included with the antenna kit, must be attached to a grounded structure, or connected to earth ground with a wire.

6. Compliance with local building and electrical codes.
7. Compliance with building lease term and easements.

When designing your outdoor GNSS antenna system, site specific designs and the use of other materials may be required. The cables should have a TNC male on one end and a TNC female connector on the other, so that they may be used as extension cables without coax barrels. The cables sold by SRS are not plenum rated. For additional TNC cables see, for example, http://www.showmecables.com/ or http://www.arcantenna.com/

The simplest semi-permanent installation uses the antenna magnetic mount placed on top of a HVAC unit on the roof. If HVAC placement is not available, the magnetic mount can be attached to a 10 lbs. weight (barbell weights work well for this purpose) and placed on the roof. Alternatively, the magnetic mount can be removed allowing the antenna to mount to a wall or pole using the included mounting arm. The antenna may also be mounted to any horizontal surface or brace which has a ¼" diameter hole.

There are two important components for lightning protection: A ground wire attached directly to the aluminum antenna mast, and a lightning arrestor/surge absorber located where the coax cable enters the building. The arrestor has a TNC male connector on one end and a TNC female on the other and a lug for earth ground in the center. Both the antenna mast ground and the lightning arrestor must be separately connected to earth ground with #10 AWG copper wire (included with kit). All outdoor TNC connectors, including those attached to the lightning arrestor, should be protected from weather and sunlight exposure with the included silicone tape wrap.