

GNSSRK-D-V

- GPS & Beidou signal indoor coverage solution
- Installation and user guide



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GNSSRK-D-V

✧ System signal :

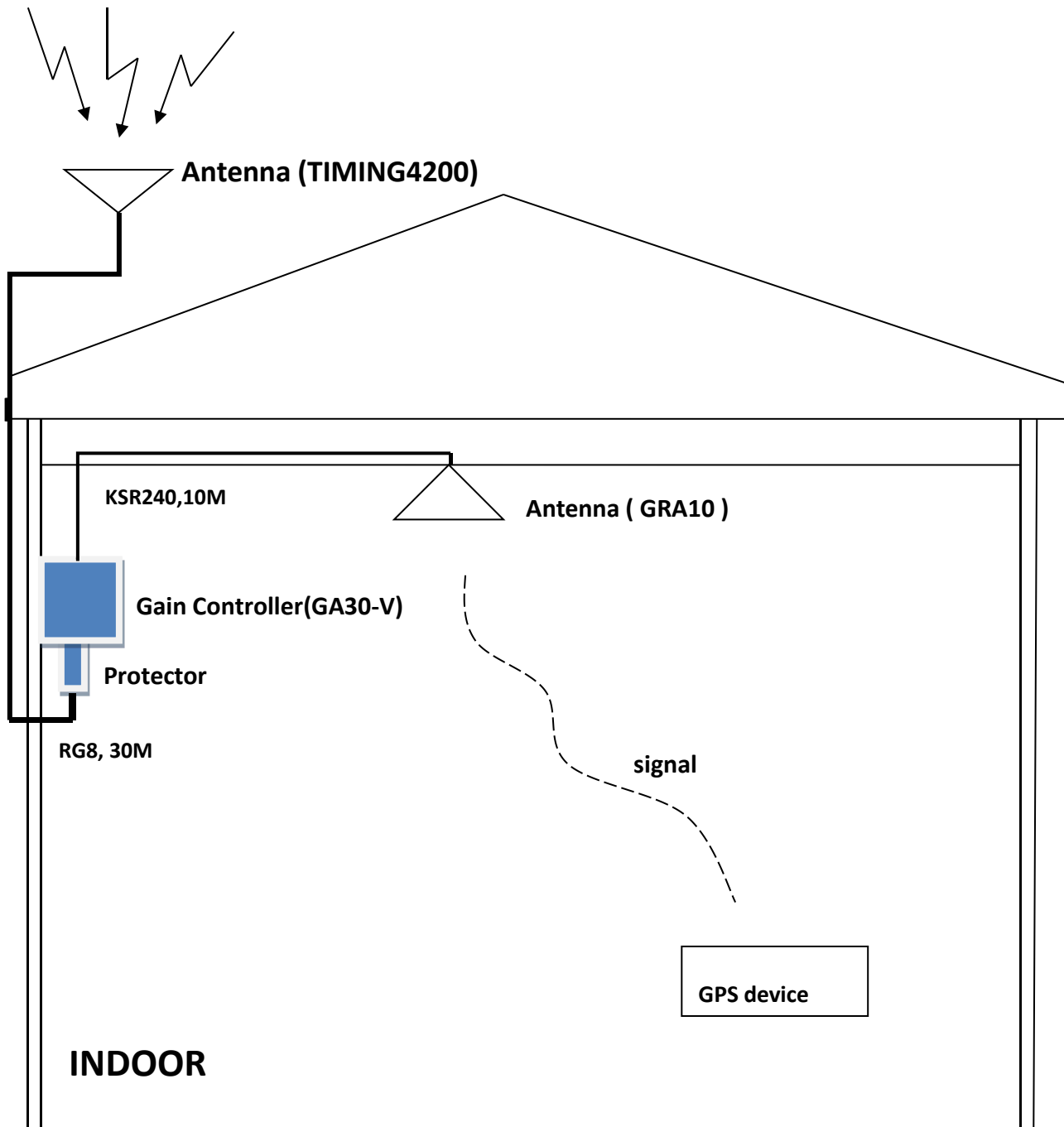
- GPS L1(1575MHz);
- Beidou2 B1(1561MHz);

✧ Antenna Frequency Range:1575 and 1561 MHz;

This is single point solution, covers 5-20 meters at radius (by increasing the amplifier according to the methods and under field conditions, building height and other certain condition reach a radius of 20 meters).

Note : Single point means one antenna be used to transmit GPS/Beidou2 signal.

GPS L1、Beidou 2 B1



1. GPS/Beidou2/...antenna(TIMING4200) be installed on roof of the building;

2. Cable assembly RG8 fixed along the out wall, one terminator connects TIMING4200, the another to protector at the appropriate place. In some special environment, select PE or PVC material plastic pipe to protect the cable assembly is quite sensible;
 3. Protector and Gain controller are fixed on the wall indoor;
 4. Cable assembly KSR240 is fixed along the ceiling of the operating place;
 5. Antenna GRA10 be fixed on the ceiling or crossbeam.
- According to the actual environment, you can adjust positions of some parts, which can make you the adjust, change and overhaul more easily.

Quality Commitment

All products have been strictly inspected, all are qualified products.

We promise one-year guaranty and 5-year available.

Under warranty, products gone wrong which be identified not be human factor, can be replaced free or repaired. Freight be charged by GEMS.

Return Policy

Our product and its packaging have LOGO and Serial-number, you should not tear up them, as we will depend on them to deal with the return product.

We haven't recruit agencies, sales and after service be took charged by GEMS. Please pay attention.

Service phone:86-755-29644311 or email to:sales@gemsnav.com ,We will response in 24 hours.

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1. Functional Description

GNSSRK is a repeater operates by receiving GPS/Beidou2... satellite signals with an antenna located outside the building and re-radiating the signals into the indoor area or covered space where satellite signal cannot reach.

GNSSRK is a single point GPS/Beidou2... repeater, one transmitting antenna transmit GPS/Beidou2/ signal. This solution offer adjustable test signal to receiver.

If need extend the system, you can add assemblies and sending antennas, so as to cover satellite signal indoor large area and more rooms or buildings.

Other documents, log in website : www.gemsnav.com , or contact: sales@gemsnav.com , or call the technical service : 86-755-29644311。

2. Typical Application

✧ For GPS/GNSS products testing

For testing the cell- phone with GPS, PND, car navigators, tracker, survey products, etc.

✧ For the purpose of GPS/GNSS signal covering

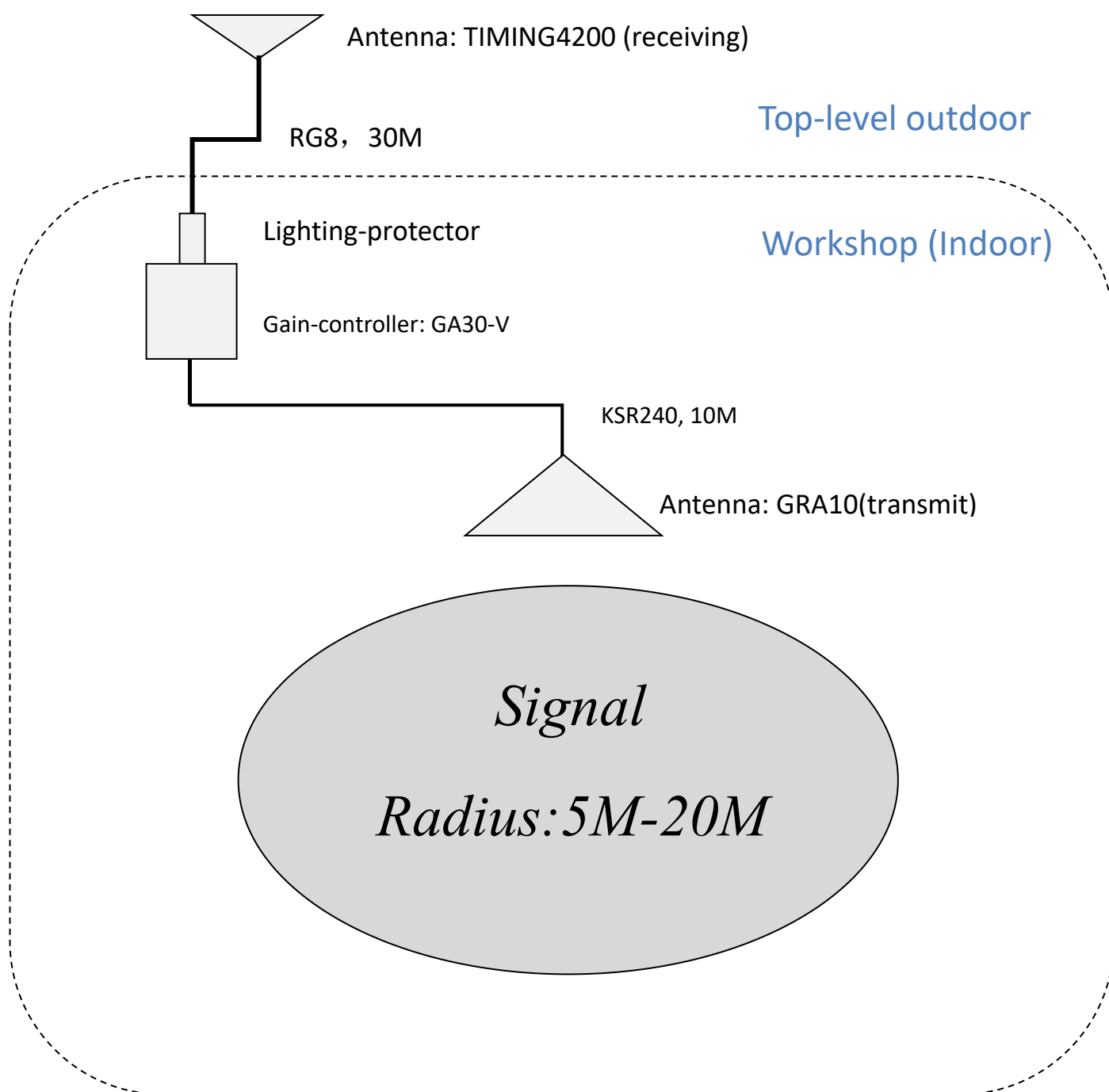
Car parks, lab, aviation manufacturing hangar, trade shows, Emergency-, safety vehicles, public transportation etc.

3. Standard Configurations

- ✧ Gain Controller:GA30-V ,1 ea;
- ✧ Receiving Antenna: TIMING4200,1 ea;
- ✧ Cable Assembly:RG8,30M, 1ea;
- ✧ Cable Assembly:KSR240,10M,1 ea;
- ✧ Sending Antenna: GRA10, 1 ea;
- ✧ Ligting-protector:1 ea;

The cable components can be selected according to the customers' environment and can communicate with our technicians.

4. Topological (Under standard configuration)



5. Kit Include

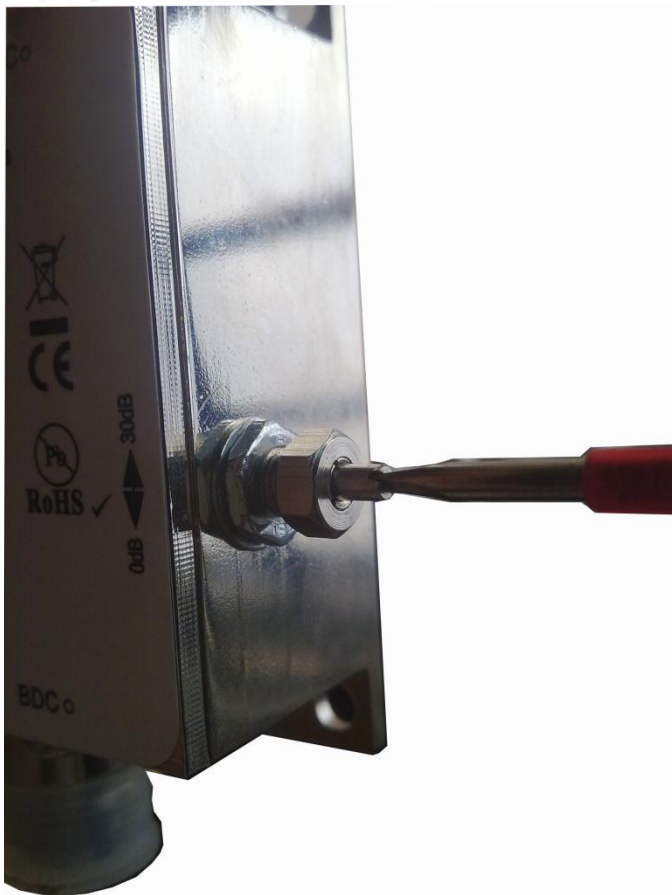
5.1 Gain Controller GA30-V

5.1.1 Function:

Used to adjust system gain, 0-30 dB adjustable, you can control when needed.

(with AC220/9V power adapter, supply power to system and itself.)

① and ② are input/output, connect to cable assembly, N female (Can be customized).



③ this knob can control gain value.

Anticlockwise: lower

Clockwise: higher

When finished the installation, you can adjust the knob, usually from high to low, the best position is when your receiver's SNR begin to weak.

5.1.2 Specification

Parameter			Conditions	Min	Typ	Max	Units
Freq. Range			In- Output ports, 50Ω	1164		1616	MHz
In &Out Imped.			In, all output ports		50		Ω
Gain	1227MHz		In- Output ports -45dBm Input Level	28	30	32	dB
	1575MHz			28	30	32	
Adjustable gain	1227MHz	Max		29	30	31	
		Min		-4	-2	0	
	1575MHz	Max		29	30	31	
		Min		-2	0	1	
Input SWR					2.5:1	-	
Output SWR					2.5:1	-	
Nois Figure					2	dB	
Gain Flatness					3	dB	
Current balance					0.5	dB	
Phase Balance					1.0	deg	
Group Delay Flatness					1	ns	
Device current					16	mA	
DC IN			The DC input on the input or output port	3	5	16	VDC
AC supply				220		AC	
Max RF Input			Maximum lossless RF input			0	dBm
Operating temperature				-40		85	°C

5.2 Antenna

5.2.1 Receiving antenna: TIMING4200



Function: Receive the GPS L1, Beidou2 B1 signal

Antenna Electrical Specifications:

Frequency Range (MHz)	1575.42±5、1561±5
Gain(dB)	≥4
Polarization	Right-hand circular polarization
Axial Ratio (dB)	< 5
3dB beam width (°)	110±10
Front to back Power (dB)	> 10
Prime power (V)	4~6
Operating current (mA)	≤45
Connector	N (Female)

LNA Electrical Specifications:

Frequency Range (MHz)	1568.42±30
Gain(dB)	34±2
Passband Ripple (dB)	< 1 (1575.42±1.023MHz) < 2 (1575.42±5MHz) < 2 (1561±5MHz)
Noise figure (dB)	≤2.7
Out of band rejection (dBc)	12 (1568±50MHz) 35 (1575±50MHz) 70 (1568±50MHz)
VSWR	S11≤2.5
1dBcompression point output (dBm)	≥-10
Surge resision	GB/T17626.5-1999; idt IEC 61000-4-5:1995

Mechanical Specifications :

Radome Material	ABS
Dimension(mm)	Ø112×205
Weight(kg)	1.42
Operating Temperature (°C)	-40~+70
Storage Temperature (°C)	-40~+85
Relative Humidity (%)	90

5.2.2 Transmitting antenna:GRA10



Function: Transmit satellite signal

Gain (dB) :3dBic, passive

Connector:SMA(Female)

5.3 Cable Assembly

We apply two cable assembly, RG8, 30M and KSR240, 10M. Please log in www.gemsnv.com, enter RG8 or KSR240, then you can see the two cable's technical specification.



RG8, 30M

5.3.1 RG8(KSR 400)

RG8, 30M is usually used for connecting GPS antenna TIMING4200 and lighting-protector. You can calculate the length according to your actual environment, also 60m or 90 be selected.

Connector N Male-N Male.

The attenuation value is 0.18 dB/m; Thus, you can assess the system, or contact with our sales to select proper configuration.

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5.3.2 KSR 240

KSR240, 10M is usually used to connect GA30-V and GRA10.

The attenuation value 0.32dB/M.

Connector: N Male-SMA Male.

5.3.3 Select Connector

Connectors are industrial standard component, below are selectable:



SMA Connectors (Male - Female)



BNC Connectors
(Male & Female)



N Connectors (Male - Female)



TNC Connectors (Male & Female)

6. Installation guide

6.1 GPS Antenna TIMING4200 Installation

Installation of the GNSS antenna Timing4200



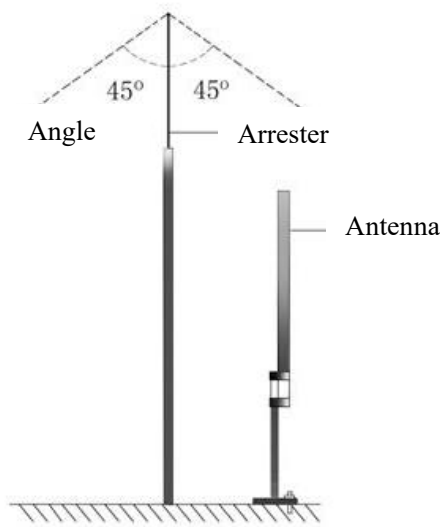
GNSS antennas can be installed on the edge of guardrail where no building more than 3m higher than antennas is visible outside 10m around the antenna.

1、Lightening protection measures for antennas

Outdoor antennas are generally installed within the lightning protection zone of the building. Arrester should be set up additionally if the antennas are higher or beyond the lightning protection zone. The arrester is as shown in the figure below. Installation precautions are:

- (1) The arrester height is determined based on the installation position of antenna and should be much higher than antennas (0.5m to 1m higher);
- (2) The arrester must be fully welded with lightning protection circuit of the building and earthing resistance should be kept lower than 10ohm;
- (3) The arrester (iron pillar) can be directly welded onto the lightning protection zone (as shown above in the figure) of the building with thick iron sheet.

Note: Lightning protection is an important and prudent discipline. We only provide you with suggestions and you need to employ professional enterprises with certified qualification to design and implement lightning protection measures.



6.1.1 Lighting Protection

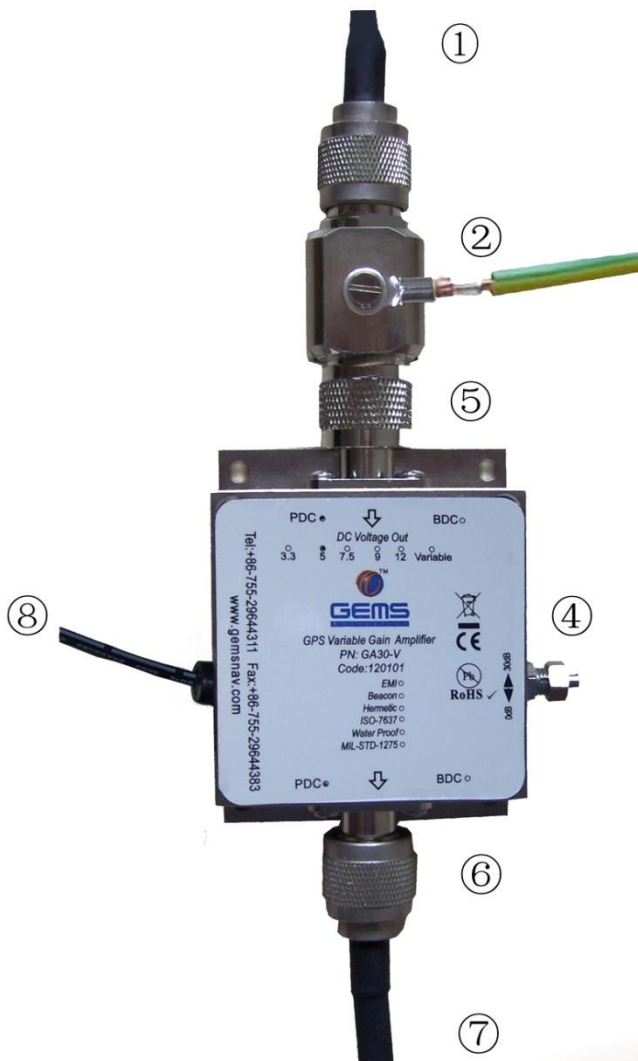
Usually, outdoor antenna is fixed under the range of building lighting-protection. If antenna is higher than this area or out of the range, set up lightning rod is wisdom.

Lighting rod, installation of attention as below:

- 1) The height of lightning rod is apply with the position of antenna, much high than antenna(0.5~1m higher and more)
- 2) Lighting rod wiled with the building circuit line, ensure ground resistant less than $10\ \Omega$.
- 3) Can directly wiled rough sheet iron to building lightning-protecting ground.(as shown above)

State: Lightning-protection is an important and cautious subject, we only suggest, design and implement lighting-protection must be done by whom was professional and have the qualification authentication.

6.2 Installation to Protector and Gain Controller



As Shown at Left:

- ① Cable assembly: connect to receiving antenna, as Timing 4200,L1A etc;
- ② Protector;
- ③ Amplifier:GA40;
- ④ Connector:NJ-NJ;
- ⑤ Gain controller:GA30-V(not reverse);
- ⑥ Cable assembly: connect to transmitting antenna, as GRA10,L1P etc.
- ⑦ Power supply.

Fix Gain controller:

You can fix according to the 4 hole location.

Notice: This device includes a power adapter, we suggest to fix it near to the power socket.

Notice for installing protector:

Earth resistance is assured less than $10\ \Omega$;
 One end of the lightning-protection line should connect to grounding ears, the other one is welded to the nearest building to assure grounding.

6.3 Fixing of GRA10



Fix the antenna on the ceiling or crossgirder. Usually at the centre of the coverage GPS & Beidou signal needed.

7. System power-supply control



System power-supply be supplied by Gain controller GA30-V.

After finishing the system installation, power on to the adaptor of GA30-V, outdoor antenna and GA30-V were on, system get to work.

8. Typical faults and solutions

GBRK GPS repeater fault location and remove:

First: Check the adapter of GA30-V, whether it connects to the power supply and power-up to GA30-V as GA30-V hasn't power light. You can test the voltage between input axis and shell, if it's about 5V, power supply was ok, GA30-V was also works ok. Or else, check the power socket to assure the contact was ok.

Second: If it's 5V at the input of Gain Controller, you need to check whether the fixing is steady between GRA10 and the cable.

Third: If the below two step were ok, please check the outdoor antenna Timing4200. You can screw the port which connect Timing4200 and cable (carefully screw, not unplug strongly). Notice: when screwing the cable connector, you should make sure to screw the iron pipe, maintain the antenna and cable moveless, which avoid to screw off the cable. After riving, check the voltage between axis of the cable connector and the outer shielding layer to make sure it's 5V. If no voltage, the circuit has fault, please contact our technical support. If 5V, the antenna Timing4200 can be suspected. (In fact, this case hasn't appear in our engineering projects.

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