Coiler Corporation

We Extend Your Coverage

TG Series
Indoor Repeater

Installation Guide

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FCC Regulations:

This equipment complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiated radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced RF (radio frequency) technician for help. Changes or modifications not expressly approved by the party responsible for compliance could void the user‘s authority to operate the equipment.

1. Safety

Any personnel involved in an installation, operation or service of the Coiler TG series must understand and obey the following:

1. Coiler TG series must be used exclusively for its application described in this guide’s product introduction and nothing else.
2. For your safety, please beware of power lines at all times during the installation and use. Please make sure to take appropriate safety measures for protection. Contact with high-voltage power lines can cause death and/or serious injury.
3. Please handle the equipment with care. Mechanical shock due to drop or mishandling can permanently damage sensitive RF components.
4. The TG series are designed for indoor applications and should be kept away from water and humidity.
5. The primary AC power range for the repeater is AC110-240V. It is possible to damage the repeater if the primary AC power is outside this range.
6. An external lightening protector is recommended when the antenna is installed outdoors.

2. Product Introduction

The Coiler TG series is designed to improve cell phone signal coverage and enhance reception in the indoor areas where mobile signal is limited or compromised due to construction structures or natural obstacles. This device is a perfect choice for network operators seeking a quick and cost-effective coverage solution for large area indoors. This product delivers the most reliable mobile performance in office and residential areas, restaurants, shops and VIP rooms, offering a power output up to +25dBm and a maximum gain of 60dB.

This device is designed as a bi-directional amplifier that receives and amplifies signals from one or more base stations and retransmits the signals to one or more mobile phones. The repeater also receives signals from one or more mobile phones, amplifies and retransmits the signals to the base stations.

This repeater supports customizable bandwidth which can boost RF signal for a continuous frequency segment. It offers adjustable gain for UL and DL to enable flexible adoption to various mobile environments.

3. Site Survey and Installation Planning

Please inspect outdoor and indoor environments in order to identify the best locations for the installation of the donor antenna, the repeater unit and service antennas. **Do not physically mount any equipment at this moment.**

1. The donor antenna should be located in the strongest signal reception area and away from any barriers, such as hills and mountains, high buildings or signboards. That may be on the rooftop or the side of the building, or inside the building close to the window. You may use mobile phone or spectrum analyzer to measure received strength signal intensity (RSSI). A perfect location should have outdoor signal strength greater than -80 dBm. Ideally the donor antenna should face the base station of the operator that signal it is intended to amplify. Depending on the application and the environment, donor antenna used can be omnidirectional, panel yagi. (please contact Coiler for optional accessories)

2. Please determine the possible number of the service antennas via calculation regarding the indoor area needs coverage, the building construction and the signal path loss. For the best performance, service antennas should be installed on the ceiling or on the wall at least two meters from the floor. Installation on the wall may however obstruct the signal and shorten the signal range. The antennas should be ideally placed centrally in the area requires coverage. Please mind the antenna isolation between the donor antenna and the service antennas. Coiler recommends that in order to avoid repeater's oscillation, the isolation should be at least 15dB greater than the gain of the repeater. For TG series, the isolation should be at least 65dB given that the equipment is set to the maximum gain value. (60dB)

3. The repeater should be located inside the building. It should be installed in a constant temperature, ventilated room. Humidity and temperature changes may affect repeater's reliability. Make sure that AC power plug is available nearby the repeater unit.

4. Cable Installation Planning

Plan the installation of the cable regarding the locations of the donor antenna, repeater unit and service antennas. Coiler recommends the 0.75” cable for the outdoor installation and 0.5” cable for indoor installations. Please make sure that cable has been equipped with appropriate connectors.

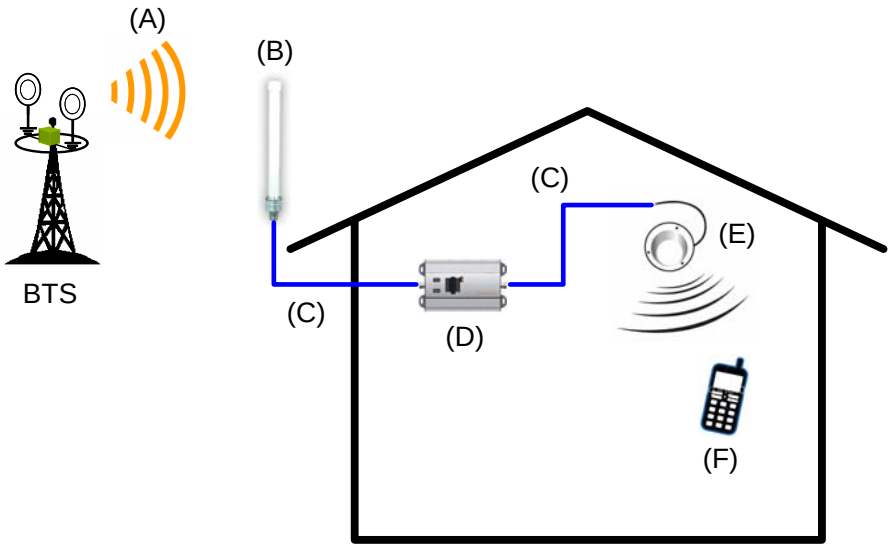
5. Link Budget Calculation

Calculate link budget for the planned installation site in order to verify effective coverage that the system will provide. You may use link budget calculation chart, calculation reference table and the following formula. You may also use the below formula to calculate gain adjustment of the repeater in case you plan a specific signal strength on the service antenna.

Indoor Signal **(F)** = Outdoor Signal **(A)** + Donor Antenna Gain **(B)** + RF Cable Loss **(C)** + Repeater Gain **(D)** + Service Antenna Gain **(E)**

For example:

F = (-80) + (3) + (-7.5) + (60) + (2) = **-22.5 dBm**



(A) Donor Ant. Signal (dBm)	(B) Donor Ant. Gain (dB)	(C) RF Cable Loss (dB)	(D) Repeater Gain (dB)	(E) Indoor Ant. Gain (dB)	(F) Indoor Signal (dBm)	Effective Service Radius (m)
-75	3	-12	60	2	-22	30m
-80	3	-12	60	2	-27	17m
-85	3	-12	60	2	-32	9m

NOTE:

1. The effective service range is defined as the distance of free space. The data is just approximate value given that the acceptable signal level of coverage is -90dBm.

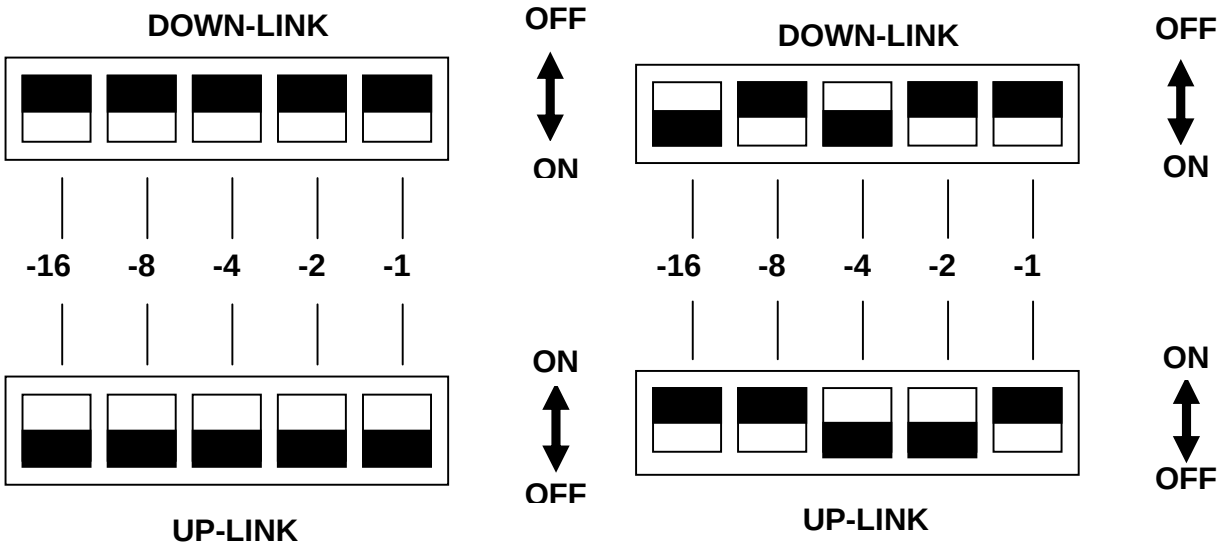
2. Above data sheet is JUST FOR REFERENCE. The actual Indoor Signal strength may vary depending on the outdoor signal strength (A) and used accessories (B, E) and cabling (C).

3. Above data is based on a single repeater unit installation and is not suitable for multi-unit installations.

6. Gain Adjustment

In order to enable flexible adoption to various mobile environments, TG series provides UL/DL DIP switch that allows individual control of UL and DL gain. The UL/DL attenuators control range from 0 dB to -31 dB in 1dB steps. The default of UL/DL gain attenuator is 0 dB and the DIP switches are positioned as shown on the figure. Please adjust UL and DL gain to the required values. UL/DL gain adjustment may be required in a situation where you intend specific signal level on a service antenna (Coiler recommends value no higher than 0 dBm – please calculate link budget above) or isolation between the donor antenna and the service antenna is not sufficient.

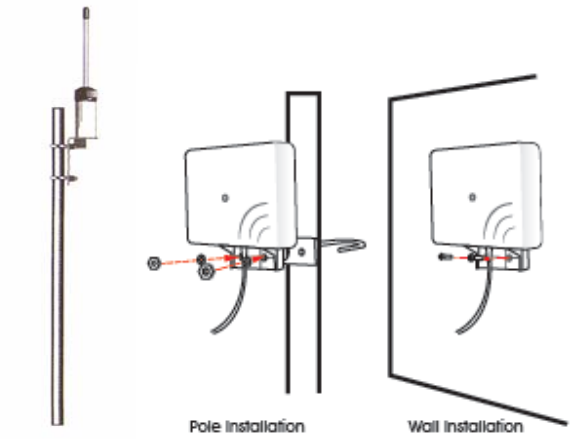
Example: if you wish to attenuate 20dB on the downlink and 25dB on the uplink, set the DIP switch as shown on the below figure.



7. Mounting and Installation

1. Please install a donor antenna in the previously selected location. Please choose a mount type for the donor antenna according to your preferences and environmental conditions. You may need to reposition or rotate the donor antenna to find the direction providing the strongest

signal strength.



2. Please mount the repeater in the previously selected location.
3. Route the cable between the donor antenna and the repeater unit. Make sure that all the connections are tightly fastened. Make sure that the cable is fastened on the wall or a cable tray and secure a connector to avoid water decaying performance.
4. Please install service antenna in the previously selected location. Route the cable between the repeater unit and service antenna. In case of multiple service antennas, use appropriate power splitters to split the signal. Route the cable accordingly. Connect the cable to the connector marked MS on the repeater and the other end to the service antenna.
5. Connect the power cable of the adaptor to the repeater where marked POWER and plug the adaptor into the power plug.
6. Switch the power button. The power indicator LED should be green. Make sure that no other LED is illuminated. If any other LED is lit, see Troubleshooting.

8. Testing

Test the repeater's performance by making phone calls using a cell phone of the appropriate operator in various location of the installation site. Make sure to check if the signal is available in the locations most distant from the service antennas and in the corners of the facility. In case there are problems occurred, refer to the troubleshooting section.

9. Troubleshooting

Situation	Solution
There is still no signal after installation of the equipment.	1. Make sure that the output power source is AC 110~220V and the repeater is switched on (green LED is on). 2. Make sure that all the connectors are tightly fastened. 3. Make sure that the outdoor signal level (RSSI) is sufficient (Coiler recommends at least -80dBm). 4. Check if the cable used is suitable (Coiler recommends cable with the level of 8D-FB or 10D-FB).

The signal strength is too weak in the corner.	1. Make sure that the donor signal (RSSI) is at the level of -80dBm or higher. 2. Check if the repeater's gain is set for full values. 3. Make sure that all the connectors are tightly fastened. 4. Check if the cable used is suitable. 5. Change the location of outdoor/indoor antennas. 6. Replace a donor antenna with one with higher gain. 7. Install additional service antenna in the corner.
After the installation there is a downlink signal detectable, but it is still impossible to make a phone call.	1. Check if the isolation between outdoor and indoor anten is sufficient. 2. Change the location of outdoor/indoor antennas. 3. Reduce the repeater's gain.
The repeater's signal is not stable.	1. Check if the outdoor signal is stable. 2. Check if the isolation between indoor and outdoor anten is sufficient. 3. Check if the antennas are in proper condition. 4. Check if the RF cable is not damaged.
The LED on the repeater's front is not lit.	1. Check the power source. 2. Check if the output power source is AC110~220V. 3. Make sure that the repeater is switched on
The AGC LED is on.	1. Check if the isolation between outdoor and indoor anten is sufficient. 2. Change the location of outdoor/indoor antennas. 3. Reduce the repeater's gain.
The PA LED is on	1. Check if the isolation between outdoor and indoor anten is sufficient. 2. Change the location of outdoor/indoor antennas. 3. Reduce the repeater's gain. 4. PA might have been broken. (IF AGC LED is not on)

Recommend returning the fault equipment back, once above condition is checked step by step.

Please DO NOT try to disassemble or repair by yourself.