Converter Installation Guide

Version 1.2

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About This Manual

The purpose of this manual is for the setup of Converter & DC Injector. This manual, revised as version 1.2 in 2003, includes procedures assisting you in avoiding unforeseen problems.

Technical Support

If you have difficulty resolving the problem while installing or using the Converter & DC Injector, please contact the supplier for support.

FCC Notice

Reminder:

To comply with FCC part 15 rules, the Converter must only be used as a system as FCC certified. The system must also be professionally installed to ensure compliance with the Part 15 certification. It is the responsibility of the operator and professional installer to ensure that only certified systems are deployed in where FCC rules apply. Further, according to FCC Part 15 regulations, Section 15.247(b)(3)(iii), the installer must ensure that the high-gain directional antenna used in this system is used exclusively for fixed, point-to-point operations and that multiple co-located intentional radiators transmitting the same information are not used. For further information, please see Appendix B.

FCC Certified Declaration:

This device 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.

Notice:

To comply with the FCC RF exposure compliance requirements, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 2 meters from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. No change to the antenna or the device is permitted. Any change to the antenna or the device could result in the device exceeding the RF exposure requirements and void user's authority to operate the device.

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Chapter 1 Introduction

K-Best's Converter operating on the 5.8GHz ISM band is a high performance two-way converter and amplifier using Time Division Duplex (TDD) technology. It is used outdoors to extend the range of wireless radio communication system such as wireless LAN point-to-point connection.

K-Best's DC injector KBDC24E provides DC power to the outdoor Converter or transponder through the RF feed cable without an additional power cord. It has some different types of connector for custom configuration. The standard products are KBDC24E-2N with female N type at both side, and KBDC24E-AN with female N type at one side and female SMA at another side.

1-1 Product Kit

Before installation, make sure that you have the following items:

- Converter
- DC Injector
- Jumper Cable
- Power Adapter
- Installation Guide
- NDC Access Point and adapter cable

1-2 Features and Benefits

- Convert the operating frequency from 2.4GHz to 5.8GHz band
- 5725~5850 MHz unlicensed ISM Band
- 200mW output power level.
- 20 dB receive gain
- Bi-directional TDD technology
- Transmitter and receiver LED
- Waterproof housing

1.3 Specifications

Specifications for DC Injector

Bias Current / DC Voltage
  1.5A (max.) / 15V (max.)
Insertion Loss
  1dB
Connector / DC Jack
  N type female for both sides / φ 6 mm, center pin φ 2.0 mm
Dimensions / Weight
  99.1(H) x 53.5(W) x 21.2(H)mm / 165g

Specifications for Converter

Operating Frequency Range
  5725~5850 MHz
Input Frequency Range
  2400~2484 MHz
Operating Mode
  Bi-directional TDD
LO Frequency & Frequency Stability
  3360 MHz; ± 2.0 ppm
Transmitter Output Power
  23 dBm (200mW)
Transmitter Gain
  Automatically adjusts to 200mW power output
Transmitter Input Power
  Min: 3dBm
  Max: 13dBm
Receiver Input Power
  Max: -25dBm
Receiver Gain
  20 dB Typical
Frequency Response Flatness
  ± 1dB over operating range
Noise Figure
  < 5 dB

Switching Time
< 1.5 μs
Connector
N-type Female (50Ω)
Operating Temperature
-30 °C ~60 °C
Power Supply
12 VDC, 1.5A recommended
Power Consumption
700mA @12 VDC
LED Indication
Transmit: Green; Receive: Red
Dimensions
195(L) x 95(W) x 23(H) mm
Weight
720g

1-4 Calculate Transmit Power

In order to obtain the best performance of converter and system, user must calculate the transmission power to meet the converter technical requirement and FCC regulations(See Appendix B). It is advised that the user follows the calculation below:

1. Converter power of the access point from milliwatts to dBm.

Note: dBm = 10 * Log(milliwatts)

2. Determine the attenuation of cable(please refer to manufacturer's specifications)

Note: Suggest the cable loss between converter and DC injector should not exceed 10 dBm generally.

Table B – Typical Cable Attenuation Values

Cable Type	Attenuation dB/100ft @2.4GHz
RG-142	21
LMR200	16.5
LMR400	6.6
LMR600	4.4
LMR900	2.92
Belden 9913	7.1

Note: Values are approximate.

3. Calculate the actual power of converter in the pole as follow:

   Access point Power(dBm) – Cable Loss(dBm) – Misc. Loss = Input Signal Level(dBm)

Note: Misc. Loss means loss of connector, adapter and DC injector and estimates to be around 2 dB.

4. If the input signal level exceeds the max. Transmitter Input Power or fails to meet the min. Transmitter Input Power of converter, the converter can't identify the input signal. Under this circumstance, user should adjust the input signal level to fit the requirement such as using an attenuation pad or a higher loss cable and vice versa.

1-5 Installing the Converter

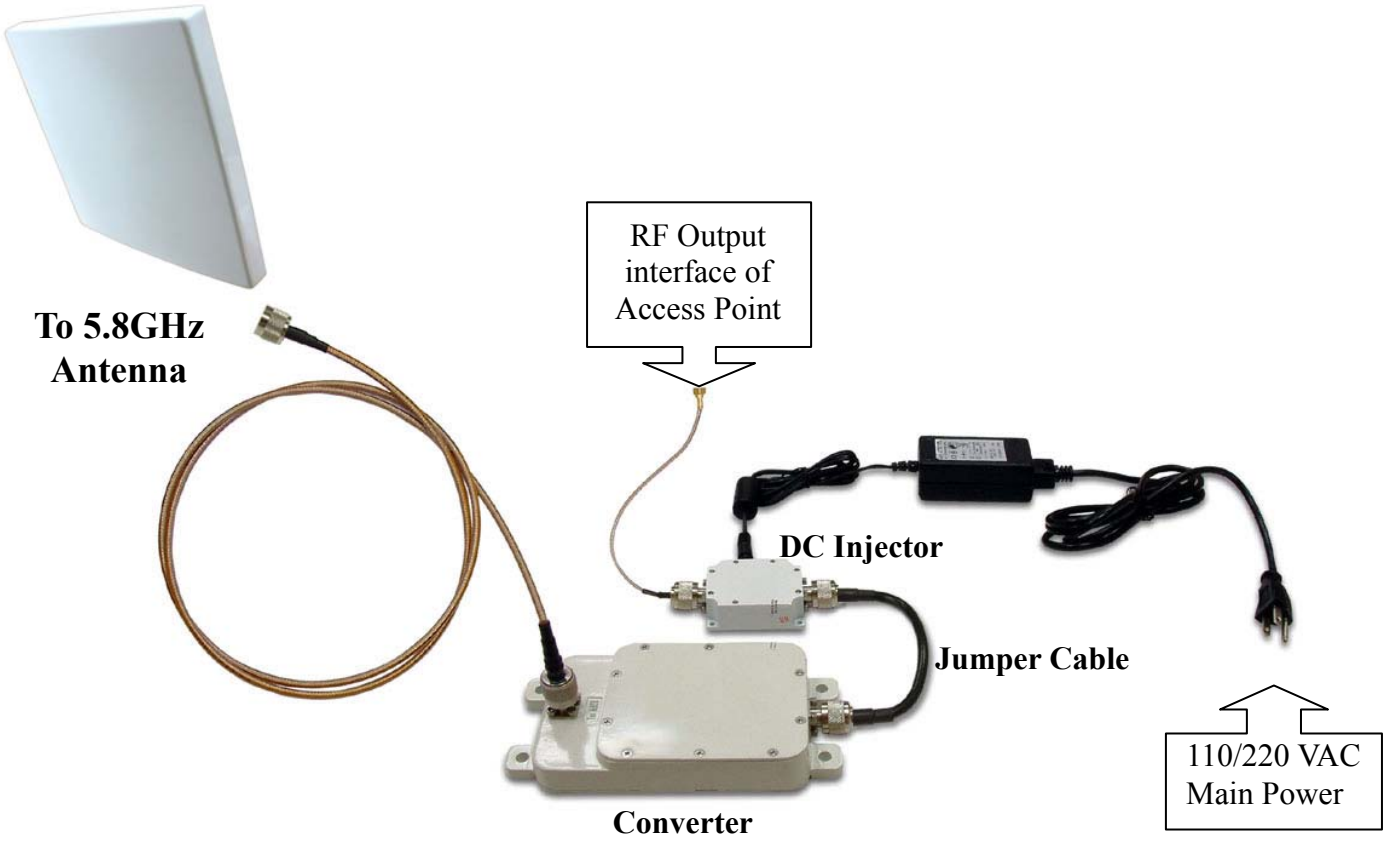
1 Connect the KBW58 RF output directly to the antenna.

2 Attach the KBW58 RF input to the DC Injector with RF cable (Jumper cable).

3 Connect the RF cable leading from the DC Injector to the antenna on the Access Point unit.

4 Plug the power cable leading from the DC Injector into any available 110/220 V outlet.

Note: Converter operating on the 5.8GHz ISM band is a high performance two-way converter and amplifier using Time Division Duplex (TDD) technology



KBW58 Installation Details

Appendix A: Channels and Cable Attenuations

Table A – Conversion Table

802.11b Channel	2.4 GHz Frequency(MHz)	5.8 GHz Frequency(MHz)
1	2412	5772
2	2417	5777
3	2422	5782
4	2427	5787
5	2432	5792
6	2437	5797
7	2442	5802
8	2447	5807
9	2452	5812
10	2457	5817
11	2462	5822

Appendix B: FCC Certified Systems

FCC ID#: QZGKBW2458-001

FCC Certified Systems consist of:

- KBW58-2020 Converter，DC Injector，Power Adapter
- NDC WLAN Access Point
- Outdoor Antenna
- Coaxial Cable

The Converter has passed the FCC regulations:

FCC part 15, subpart C(2002)

Table A – Authorized Antennas

Model	Antenna Type	Antenna Gain(dBi)	Max EIRP(dBm)
KBNT5819-16	Flat Panel	19	42
KBNT5822-16	Flat Panel	22	45
KBNT5826-13	Parabolic Grid	26	49

Note: Cable calculation must be performed using 2.4GHz attenuation values because all signals pass between the Access point and Converter are at a frequency of 2.4GHz.

Appendix B (Continued)

Table B – Authorized Cables with Minimum Length

Cable Type	Minimum Length	Maximum Recommended Length
RG6/U	35 feet	75 feet
RG142	27 feet	60 feet
LMR400	100 feet	250 feet
LMR500	125 feet	300 feet
LMR600	150 feet	370 feet
LMR900	230 feet	560 feet
LMR1200	300 feet	700 feet
LMR1700	410 feet	950 feet

Note: This table is for reference only.

Notice:

This device 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.

Appendix C: Troubleshooting

If there is no signal output, please check the following item:

1. Check whether the LED indicator on the DC injector is on. If not, it means there is problem with the power component.
   (1) Check if the power cord is correctly connected with the power adapter and the power outlet.
   (2) Check if there is electricity on power outlet.
2. Check if the access point is working properly.
3. Check if the connection between converter and DC injector is correct, or whether the connector is loose or not.
4. Verify if the transmit power which calculated before is correct.
5. If none of the above measures could solve troubleshooting, please contact the supplier for further support.