



ABE10DC / ABE10DCF

10W Ext. C-Band BUC

USER MANUAL



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Scope

This document covers the installation, operation, and maintenance of the ABE10DC BUC. It contains information intended for engineers, technicians and operators working with the block up converter.

To make inquiries, or to report errors of fact or omission in this document, please contact **Actox Corporation** at toll free 866-888-6087.

Introduction

The ABE10DC is a reliable, high quality, cost efficient stand-alone block up converter. The application for this block up converter is C-Band VSAT communication in an outdoor environment. This line of superior products, engineered using state of the art technology, is characterized by unparalleled durability and dependability.

This is the smallest and lightest 10W L-To C-Band Block Up Converter and is designed to be mounted on the feed horn. The unit is ideal for portable and mobile applications.

KEY FEATURES

RF Frequency: 5.850 to 6.725 GHz

IF Frequency: 950 to 1825 MHz

L.O. 4.90 GHz

Auto-ranging powering option 15-60 VDC

Incomparable low power consumption (39W max.)

Field-exchangeable (F/N) IF connector

Digital temperature compensation

L.O. lock, 10MHz and amplifier LED

Internal 10MHz high stability reference (optional)

RoHS compliant

Receiving and Inspection

The block up converter is designed to function outdoors and will arrive in a standard shipping container. Immediately upon receipt of the block up converter, check the packing slip against the actual equipment you have received. Inspect the shipping containers exteriors for visible damage incurred during shipping.

Handle the block up converter with extreme care. Excessive shock may damage block up converter's delicate internal components.

Using the supplied packing list, verify that all items have been received and undamaged during shipment. Verify that all items are complete. If there are any omissions or evidence of improper packaging, please notify **Actox Corporation** immediately.

Equipment Damage or Loss

Actox Corporation is not responsible for damage or loss of equipment during transit. For further information, contact the responsible transport carrier.

When declaring equipment as damaged during transit, preserve the original shipping cartons to facilitate inspection reporting.

Return of Equipment

When returning equipment to **Actox Corporation** for repair or replacement:

- Identify, in writing, the condition of the equipment,
- Refer to the Invoice, Purchase Order and the date the equipment was received.

Notify Actox Corporation RMA department of the equipment condition and obtain a Return Material Authorization (RMA) number and shipping instructions.

NOTE

*Do not return any equipment without an RMA number.
This is important for prompt, efficient handling of the
returned equipment and of the associated complaint.*

Preparing for Installation

Before attempting to install or use the block up converter, we recommend that you first familiarize yourself with the product by reading through this manual. Understanding the operation of the system will reduce the possibility of incorrect installation, thereby causing damage or injury to yourself or others. The block up converter **must** be installed in accordance with the conditions and recommendations contained in the following sections.

Safety Precautions

Carelessness or mishandling of the block up converter may damage the unit causing serious injury to yourself or others. Please adhere to the following:

WARNING!!

If your unit is equipped with an AC power cord and plug, do not tamper with, or attempt to reconfigure, the cord or plug supplied with the unit, as this can:

Result in personal injury;

Void the warranty;

Cause damage to the units or related equipment.

Installation & Overview

General Description

This section describes the installation and theory of operation of the block up converter.

ABE10DC is powered by +15~+60 VDC via IF connector

It will amplify an input signal from an L-Band RF source up to a power level of 10 Watts (min) CW in C-Band.

The block up converter can be used as a stand-alone unit or in a redundant configuration.

Specifications

Table 1 summarizes the specifications of the ABE10DC BUC. For mechanical specifications, refer to the outline drawing, Appendix 1.

General Considerations

The block up converter shall meet all specifications over full bandwidth and under all environmental conditions when terminated with a load of VSWR at 1.5:1 unless otherwise specified. All RF specifications shall be met within five minutes after applying power, except gain flatness, which shall be met after a warm-up period of ten minutes. During the warm-up period, the block up converter shall not exhibit any alarm or require an RF mute input signal to reset any alarm/fault latches.

Securing the Block Up Converter

Align the block up converter output waveguide flange with the mating flange of the antenna feeder waveguide. Using the O-ring and hardware provided, connect the antenna feeder waveguide. Torque the flange screws to 16 inch-pounds (1.8 N-m). Attach the proper cables for waveguide for IF input, AC power and M&C if equipped to the corresponding connectors of the block up converter.

The cylindrical connectors are labeled clearly and have different pin layouts. It is impossible to incorrectly install the mating connectors.

Installing the Block-Up Converter

Tools and Test Equipment

Have on hand a standard electrician's tool kit and any tools listed in the antenna manufacturer's installation instructions.

Site Considerations

The BUC is designed to mount on the antenna. Locate and install the antenna according to instructions supplied by the antenna manufacturer. Choose an area that is free of extraneous interference from motors and electrical equipment and has a clear line of sight from the antenna to the satellite. Lightning arrestors should be used at the site to protect personnel and equipment.

Preparation

Mounting Considerations:

Optional Mounting Brackets are available that will facilitate mounting for most antennas.

The ODU must be mounted such that:

- Sufficient support is afforded to the BUC, the LNB and the Power supply to minimize the effects of antenna sway in strong winds.
- Air movement across the heat fins is possible.
- The length of the Power supply cables is taken into consideration in determining the mounting location of the power supply.

Throughout installation and during any polarization, azimuth or elevation adjustment, ensure that cables and waveguide are not crimped or pinched.

LED Indication

SSPA LED Green	All OK
SSPA LED Red	Summary Alarm
L.O. LED Green	L.O. is set to 4.90 GHz
10MHz LED Green	External 10MHz Reference
10MHz LED Red	10MHz is Absent
10MHz LED Green Blinking	Internal 10MHz Reference

10MHz Reference

The BUC must receive a stable external 10MHz reference provided by a stable signal source such as a signal generator, satellite modem or injected externally with a Bias T (for example, ABT6ARN/ABT6ARF manufactured by Actox Corporation) or a similar bias T type.

Please make sure to check the sticker on the BUC for the appropriate power source before any power connections are performed.

Recommended Test Equipment

The following equipment or equivalent is recommended for installation and system alignment:

Equipment Type

Spectrum Analyzer	HP8563E
Digital Voltmeter	Fluke 8050
Adapter Waveguide to coax	C or Ku-band
RF cables	With calibrated insertion loss up to 15GHz
40 dB attenuator	High Power to match HPA output.

Assortment of cables, connectors and adapters (calibrated up to 18 GHz).

Ensure that the BUC TX output power is disabled to prevent accidental transmission interference with adjacent satellites or transponders before attempting to align or performing any other operation involving the ODU. Before attempting any system change, carefully evaluate the possible effects of the transmitted signal.

Connections and Mounting Hardware

The IF input connection requires a coaxial cable with an F or N type connector. The RF output requires a waveguide with a CPR 137 G flat flange. A gasket shall be used to seal the waveguide connection.

Assembly and Installation

Use the information in this section as a guide to assemble and install the block up converter. The specified humidity is up to 100% during operation. However, installation should be carried out in dry conditions, free of salt spray or excessive humidity. This will eliminate the possibility of moisture and other foreign substances from entering the output waveguide flange.

CAUTION!!

Only authorized technical personnel should perform the Installation and proper electrical hookups of the block up converter.

The block up converter is designed to operate in an outdoor environment and is waterproof when mounted in the correct orientation. To provide a sufficient airflow, the block up converter should be mounted with a minimum clearance of 3 inches on all four sides and the bottom. Adequate cooling for the block up converter will provide years of top performance.

Functional Overview

General

This section describes the block up converter functions in detail. The functional overview explains the RF amplification, monitor & control and power distribution.

IF/RF Conversion and Amplification

The IF Input requires a signal with a 10MHz reference, and 15-60 VDC power source. 2-4.5Amps nominal enters the BUC by a coaxial cable, converted to C-Band by the BUC and goes through an internal isolator and reject filter, which provides a good VSWR at the input. Under normal operation, the RF amplifier will amplify the RF Input signal level up to a power level of 40 dBm or 10 Watts CW minimum.

To achieve the rated output power of the RF Amplifier, provide the necessary gain and low insertion loss. The amplified signal is transmitted through the output waveguide section to a satellite up-link system.

Monitor and Control (optional)

The block up converter may have a RS-485 and RS-232 serial interface. With this option the block up converter can communicate to the indoor unit or redundancy control block up converter via RS-485 or RS-232.

The control system can provide the following M&C functions:

- BUC Alarm (via RS-485/RS-232): when an input BUC within the block up converter system current draw is below 0.3A, a BUC alarm signal will be transmitted via the RS-485/RS-232 serial interface.
- Mute Control (via RS-485/RS-232)
- Mute Control (via hardware line): TTL high level signal will mute a block up converter
- Output Power Monitoring: 20 dB dynamic range (via RS-485/RS-232)
- Base Plate Temperature Monitoring (via RS-485/RS-232)

Operation

It shall be performed by authorized personnel prior to maintenance and/or repair.

Procedure

Verify that the installation procedure described was completed. A complete physical check of the customer's system is suggested.

WARNING!!

*The output power available at the output waveguide flange is extremely hazardous. Under **no circumstances** should block up converter be operated without the waveguide feed or a high power load attached. Do not operate this equipment in the presence of flammable gases or fumes. Failure to observe this precaution will result in personal injury. Safe and careful installation of this block up converter will eliminate the possibility of accidents and provide years of top performance.*

Verify the antenna feed waveguide connection is properly done before the block up converter is energized.

NOTE

The block up converter can withstand any source or load VSWR. However, the block up converter will meet all specification requirements only if the source/load VSWR is sufficient. Normal operation is not possible if the antenna feeder VSWR is greater than 1.5:1.

Turn ON the power and allow a warm up period of twenty minutes before operating the block up converter. This will assure stable gain and power. The block up converter can function with a coupler when a direct measurement of the output power is made.

Maintenance

This section contains information on how to maintain, troubleshoot and repair the block up converter. The block up converter is extremely reliable, requiring very little preventive maintenance, or repair. Should there be a malfunction, this section also contains technical information to help diagnose basic failures.

Preventive Maintenance

WARNING!!

Shut down the block up converter before disassembly and remove all cables and connectors. Failure to observe this precaution may result in personal injury or death. This includes the removal of any RF power originating from other system components.

When the block up converter is in the **hot stand-by mode** in a redundant system, switch it to the operation mode at least once every three months.

When the block up converter is in the **cold stand-by mode** in a redundant system, switch it to the operation mode at least once every three months.

Block Up Converter Cooling System Preventive Maintenance

Preventive maintenance is limited to checking the performance of the block up converter cooling system. No electrical or mechanical adjustments are required for normal operation.

Performance Check

Verify the system is properly set up.

It is recommended to measure the following parameters for ensuring that the block up converter is in good working condition:

- Gain and Gain flatness
- RF load VSWR and RF source VSWR
- Two-Tone Inter-modulation Distortion
- Return Loss at connectors of the block up converter

Using a Source and an IF input signal level within the small signal region of the block up converter, measure the power level at connectors IF or MS connector. Plot the swept response on a test data sheet. From the plot, determine gain and gain flatness.

Plot the swept return loss for both the IF Input and RF Output signals on a test data sheet. From the plot determine the return loss.

From the output power measurements determine rated output power. Record value on a test data sheet.

Measure the Two-tone Inter-modulation Suppression using two equal signals separated by 5 MHz. Record value on test data sheet.

WARNING!!

Cable connection and disconnection shall be done carefully to avoid physical damage to the cables and connectors, which may cause intermittent problems in the future.

Symptom	Action
Fails performance test	Check power source, RF source, cabling and connectors. Check LED indicators for status and if the light is red contact Actox Corporation. If we are not able to assist you remotely, return block up converter to Actox Corporation after RMA number has been issued.

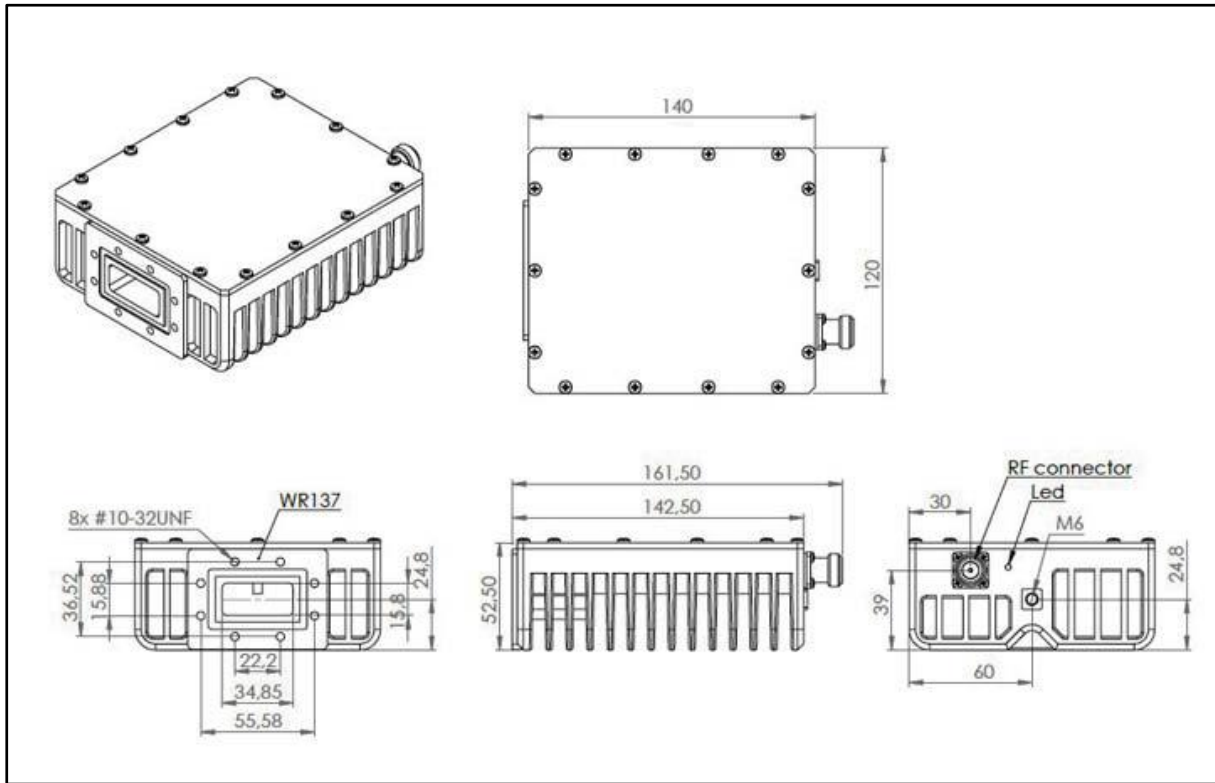
Out-of Warranty Repair

A non-warranty and out-of-warranty repair service is available from Actox Corporation for a nominal charge. The customer is responsible for paying the cost of shipping the BUC both to and from Actox Corporation for these repairs.

Appendix 1. Technical Specification

RF frequency	5.850 to 6.725 GHz
Local oscillator	4.90 GHz
IF frequency	950 to 1,825 MHz
Output power	10W (+40 dBm min.), P-Linear 5.3W (+37.2 dBm min.)
IF connector	N-type or F-type (field-exchangeable)
Power supply : auto-ranging via IF connector	+15 VDC ~ +60 VDC, 39W max.
Output interface	CPR 137 G
Gain	65 dB nominal
IMD3	-26 dBc max. 2 signal 5MHz apart at P-LINEAR
L.O. leakage	-45 dBm max.
Spurious	-50 dBc max.
Spectral regrowth (QPSK at 1.5x and OQPSK at 1.0x symbol rate offset with 2dB back-off from rated output power)	-30 dBc
Requirement for external reference: frequency input power	via IF cable 10 MHz (sine-wave) -5 to +5 dBm @ input port
TX Gain variation	± 0.5 dB over 40 MHz ± 1.8 dB over full band
TX Gain stability over temperature range	± 1.5 dB typ., ± 1.8 dB max.
Phase noise (Exceeds Intelsat's standard IESS308/309)	-53 dBc/Hz max. @ 10 Hz -63 dBc/Hz max. @ 100 Hz -73 dBc/Hz max. @ 1 KHz -83 dBc/Hz max. @ 10 KHz -93 dBc/Hz max. @ 100 KHz -113 dBc/Hz max @ 1 MHz
Noise power density	Transmit -66 dBm/Hz (max.) Receive -157 dBm/Hz (max.)
Noise figure	15 dB max.
Input V.S.W.R.	1.5 : 1 max.
Output V.S.W.R.	1.5 : 1 max.
Mute	Shut off the BUC in case of L.O. unlocked
Status LED Amplifier L.O. 10MHz	RED GREEN GREEN GREEN GREEN blinking RED Summary alarm All OK All OK L.O. is set to 4.9 GHz External 10MHz reference Internal 10MHz reference No 10MHz reference detected
Temperature range (ambient) operating storage	-40 deg C to +55 deg C -55 deg C to +85 deg C
Vibration and shock	Complies with MIL-STD-810E
Altitude	Up to 23,000 feet
IP rating	IP67
Dimensions & housing	140 (L) x 120 (W) x 52.5 (H) mm 5.51"(L) x 4.72"(W) x 2.07" (H)
Weight	1 kg (2.2 lbs) max.

Appendix 2. Mechanical Drawing



Appendix 3. Spare Parts

The following sheet can be copied and used as a fax form to order the required spare parts. Please make sure to include all identifying information to facilitate the processing of your order. The order may be sent via email to the following address.

Fax: 1-866-888-6087

Email: mark_moore@actox.com

For additional information, please contact our customer service department at: (619)906-8893 or 1-866-888-6087

Actox Corporation <i>designers and manufacturers of telecom & wireless products</i>					
Spare Parts Order Form		ABE10DC Ext. C-Band BUC			
From:					
Place By:		Signature:			
Telephone:					
Fax		Email:			
Part Description		Part Number	Quantity	Unit Price*	Line Total*

Fax to: Customer Service 1-866-888-6087