

**RETIRED**



**microBlox® Series, uBTA-P-2MR and uBTA-P-2SR  
Dual Channel Transmitter/Alarm Carriers for *Bluetooth*®  
Wireless Technology microBlox® Input Modules**

**USER'S MANUAL**



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**IMPORTANT SAFETY CONSIDERATIONS**

You must consider the possible negative effects of power, wiring, component, sensor, or software failure in the design of any type of control or monitoring system. This is very important where property loss or human life is involved. It is important that you perform satisfactory overall system design and it is agreed between you and Acromag, that this is your responsibility.

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**GETTING STARTED**

**DESCRIPTION**

Symbols on equipment:



Means “Refer to User’s Manual (this document) for additional information”.

- uBTA-P-2MR      A combination Transmitter/Alarm Carrier for dual uB input modules with dual SPDT mechanical relays per channel.
- uBTA-P-2SR      A combination Transmitter/Alarm Carrier for dual uB input modules with dual SPST Solid-State relays per channel.

These carriers are used with Bluetooth wireless technology versions of Acromag microBlox® modules to build powerful alarms and voltage/current transmitters (uB modules are not included, see below for compatible uB models). Modules are isolated input-to-output and these carriers add power isolation and alarm functionality to the microBlox® modules with two relay contacts per channel. Up to two high/low limits or two window alarms may be configured for each channel via Bluetooth wireless technology communication from your Android or iOS smartphone or tablet.

**uB Models Supported (10/11 Bluetooth Wireless Technology Models Plug-In)**

Input Model	Module Input Limits	Module Output
uB31-B/uB41-B	±1V to ±60V	0-5V
uB30-B/uB40-B	±10mV to ±100mV	
uB32-B/uB42-B	4-20mA/0-11.17mA DC	
uB34-B/uB35-B	2/3/4-Wire Pt RTD	
uB37-B/uB47-B	J/K/T/R/S Thermocouple	

This microBlox® module carrier adds wide-input isolated power (including redundant power capability), cold junction compensation for thermocouple modules, dual isolated alarm relays, plus simultaneous voltage and current output, and LED indication for Bluetooth wireless technology link, power, and each relay for each channel. The microBlox® (uB) modules offer a flexible space-saving solution for isolating, monitoring, and driving industrial process signals to interface with modern data acquisition equipment. One or two input modules plug into this carrier to build dual limit or window alarms and/or voltage/current transmitters. Different input types can be plugged into these carriers to form different alarm types, normally without recalibration. Like all microBlox® components, these carriers have high immunity to harsh industrial environments, are CE and ATEX / IECEx compliant, and UL approved for installation in Class I, Division II hazardous locations.

## Key Features



- Field plug-in microBlox® input modules allow you to quickly change input types on this carrier, usually without recalibration. Modules are over-molded and RoHS compliant, and offer superior shock, moisture, and dust protection.
- Each module channel has dual alarm outputs that are configured using Bluetooth wireless technology. Two carrier models are available—one with mechanical relays (5A/250VAC/30VDC), one with solid-state relays (1A/200Vpk AC/DC).
- Free Bluetooth wireless technology Configuration App with Android™ or iOS™ support, no additional software required.
- 16-character Password Protection for Bluetooth wireless technology access.
- Designed, hardened, and thoroughly tested for use in Harsh Environments.
- CE Approved & UL/cUL Class I, Division 2 Approvals.
- FCC Conformity Class B.
- ATEX / IECEx Certified for Explosive Atmospheres.  
 Ⓔ II 3 G Ex nA nC\* IIC T4 Gc -40°C ≤ Ta ≤ +75°C (\* for Model uBTA-P-2MR)  
 DEMKO 18 ATEX 2086X and IECEx UL 18.0092X
- Designed and manufactured for High Quality/High Reliability with AS9100 (Aerospace Quality)/ISO9001.
- Carrier includes both 0-5V/1-5V and 0-20mA/4-20mA transmitter outputs.
- Better than ±0.1% alarm and transmitter output accuracy.
- Wide ambient temperature operation from -40°C to +75°C with very low drift.
- All I/O and power ports are transient protected.
- Wide-range isolated DC power input from 6-32V.
- LED indication for Bluetooth wireless technology link, power, and each relay aides trouble-shooting.
- High 1500VAC Safety Isolation between each field input, transmitter outputs, relay contacts (including between contacts), and input power. Individually isolated for common-mode voltages up to 250VAC, or 354V DC off DC power ground, on a continuous basis (will withstand 1500VAC HIPOT/dielectric strength test for one minute without breakdown). This complies with test requirements of ANSI/ISA-82.01-1988 for voltage rating specified.
- High Shock (25G) and Vibration Immunity (4G) - Conforms to: IEC 60068-2-6: 10-500 Hz, 5G, 2 Hours/axis, for sinusoidal vibration; IEC 60068-2-64: 10-500 Hz, 5G-rms, 2 Hours/axis, for random vibration, and IEC 60068-2-27: 30G, 11ms half-sine, 18 shocks at 6 orientations and 50G, 3ms half-sine, 18 shocks at 6 orientations, for mechanical shock.
- EMC (Electromagnetic Compatibility) – Min Immunity per BS EN 61000-6-1 (2007); CE marked, per EMC Directive 2014/30/EU. Electrostatic Discharge Immunity (ESD), per IEC 61000-4-2; Radiated Field Immunity (RFI), per IEC 61000-4-3 and ETSI EN 301 489; Electrical Fast Transient Immunity (EFT), per IEC 61000-4-4; Surge Immunity, per IEC 61000-4-5. Conducted RF Immunity (CRFI), per IEC 61000-4-6.
- Low Radiated Emissions - This is a Class B Product with Emissions per BS EN 61000-6-3 (2007+A1:2011) and Spurious Emissions per ETSI EN 300 328. Enclosure Port, per CISPR 16. Low Voltage AC Mains Port, per CISPR 16.
- Installation Category - Suitable for installation in a Pollution Degree 2 environment with an Installation Category (Over-voltage Category) II rating per IEC 1010-1 (1990).

### Application



These carriers allow one or two Bluetooth wireless technology enabled microBlox® input module(s) to be plugged in and mounted on T-type DIN rails, to function as an alarm, a voltage transmitter, and a current transmitter for each channel. Alarm carriers support ten of eleven available uBxx-B input models with Bluetooth wireless technology (it does not support the uB45-B frequency model for alarm functionality, but will accept the uB45 for transmitter operation). The carrier provides isolated Host power to the module, and separately isolated relay contacts at each channel (dual FORM C mechanical or dual FORM A solid-state relay contacts). The carrier also provides a wired interface for the module’s own 0-5V/1-5V output and adds a tandem 0-20mA/4-20mA current output. Alarm levels are configured inside the captive Bluetooth wireless technology module via a smartphone or tablet using our free mobile app.

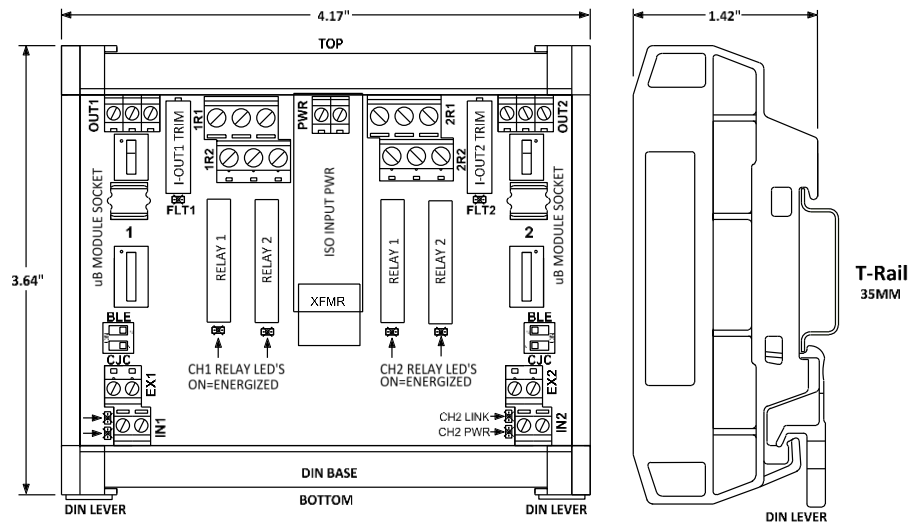
**Note:** For alarm operation, the plugged-in Bluetooth wireless technology input module must be configured for the alarm carrier, with 0-5V/1-5V output and have any input sub-range scaled to a 0-5V/1-5V output. However, for transmitter-only operation, it will optionally support up to 52 fixed-range input models that have 0-5V outputs, and provide isolated power to the module, while driving separate transmitter outputs of 0-5V/5mA, or 0-20mA/0-550Ω.

### Mechanical Dimensions

Carriers are mounted to 35mm “T” type DIN rail (35mm, type EN50022).

**WARNING:** IEC Safety Standards may require that this device be mounted within an approved metal enclosure or sub-system, particularly for applications with exposure to voltages greater than or equal to 75VDC or 50VAC.

**uBTA-P-2MR & uBTA-P-2SR BACK-PANEL DIMENSIONS w/o MODULES**  
BOARD COMPONENTS EXTEND UP TO 0.65" ABOVE PANEL. THE uB MODULES EXTEND 1.4" ABOVE PANEL.

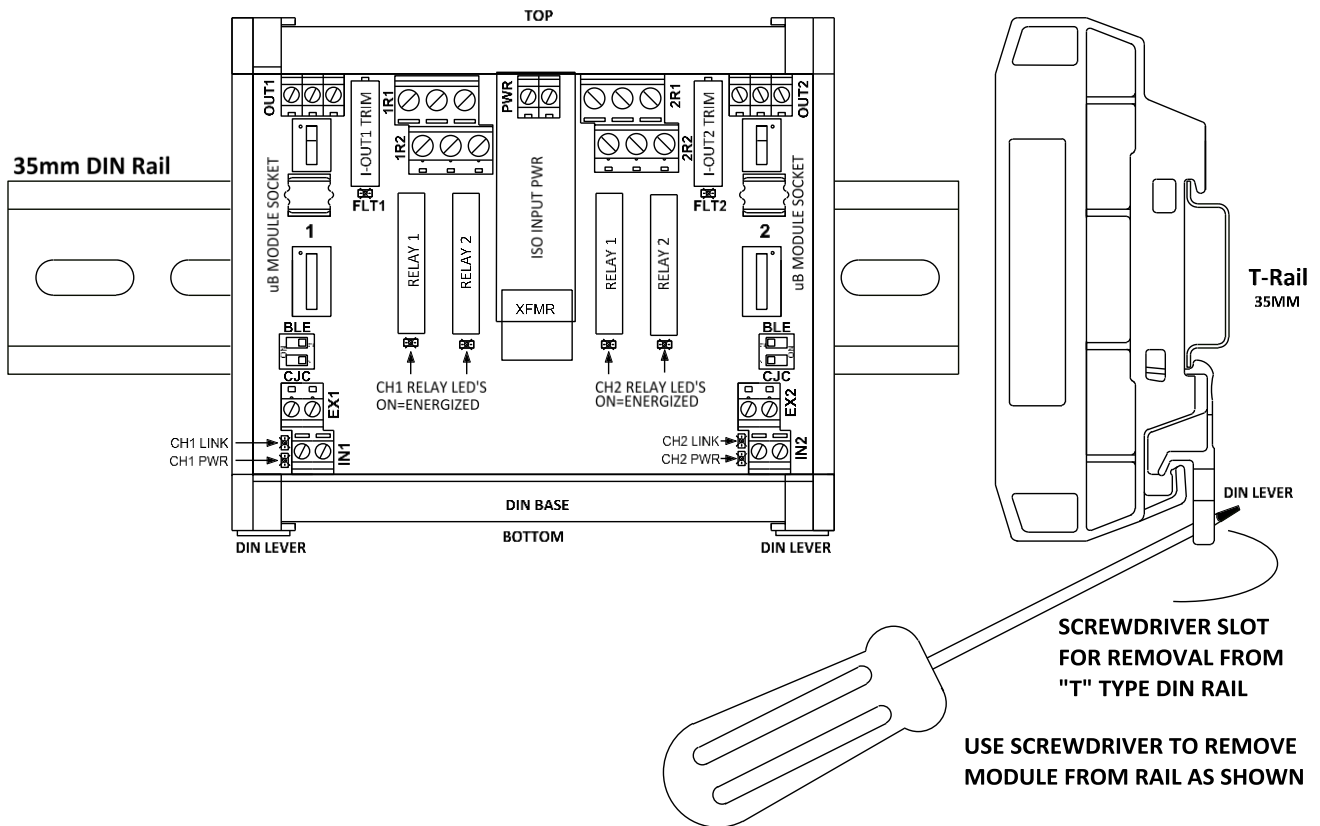


## DIN Rail Mounting & Removal

Refer to the following figure for attaching and removing the carrier from the DIN rail. A plastic spring DIN clip is located on the bottom side at each end. You can pry the DIN clip back with a screwdriver along the bottom to release the unit and lift it from the rail.

To attach the carrier to T-type DIN rail, position the top groove of the DIN Clip along the rail and push the bottom inward to snap it into place on the DIN rail.

To remove it from the DIN rail, first disconnect any I/O and relay wiring from its terminals. While holding the carrier secure, insert a screwdriver along the bottom edge of the carrier into the loop of the DIN rail clip and use it as a lever to force the DIN rail clip down, while pulling the bottom of the carrier outward until it disengages from the rail. Then tilt the carrier upward and lift it from the rail.



## ELECTRICAL CONNECTIONS

**WARNING – EXPLOSION HAZARD –** Do not disconnect equipment unless power has been removed or the area is known to be non-hazardous.

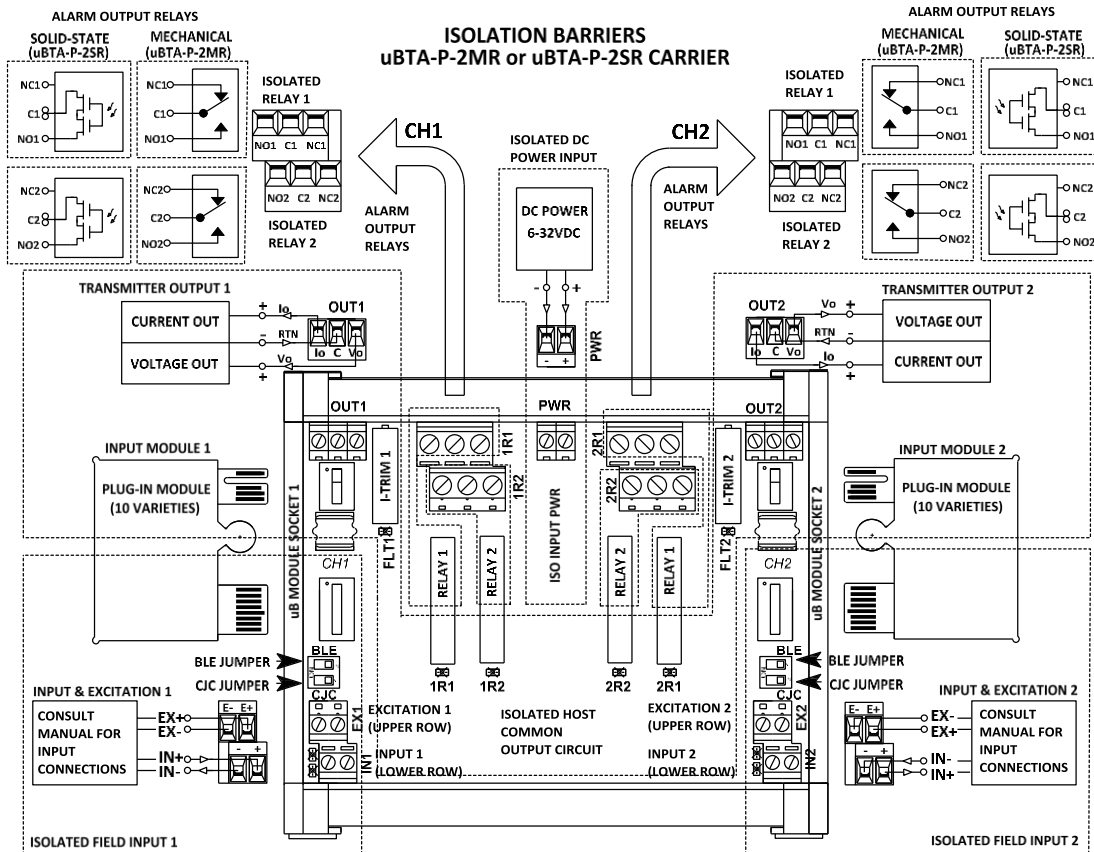
**WARNING – EXPLOSION HAZARD –** Substitution of any components may impair suitability for Class I, Division 2.

**WARNING – EXPLOSION HAZARD –** The area must be known to be non-hazardous before servicing/replacing the unit and before installing.



Carrier terminals can accommodate 16–26 AWG (1.31–0.13mm<sup>2</sup>) solid or stranded wire with a minimum temperature rating of 85°C. Input wiring may be shielded or unshielded type (twisted pair or shielded twisted pair input wiring is recommended). Strip back wire insulation 0.25-inch on each lead and insert the wire ends into the cage-clamp terminal block connector. Use a screwdriver to tighten the screw by turning it clockwise to secure the wire (use 0.22–0.25nM torque). Since common mode voltages can exist on I/O wiring, adequate wire insulation should be used and proper wiring practices followed. As a rule, input wires are normally separated from power, output, and relay wiring for safety and isolation support, as well as for low noise pickup.

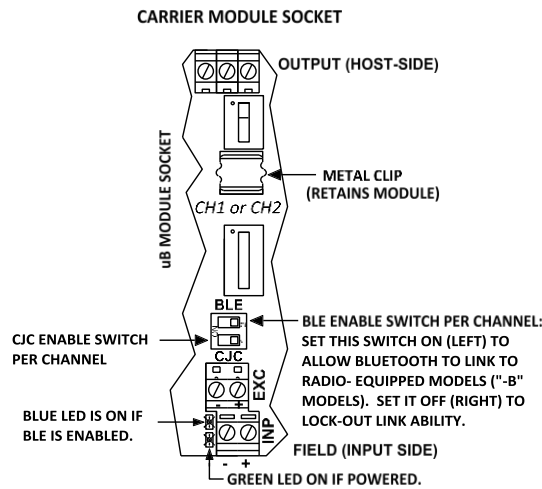
### Isolation Barriers



## How to Enable or Disable CJC and BLE Linking

DIP switches are used on this carrier to enable BLE linking and/or CJC connections at each channel, and they act identically to their same settings as for standard uB back-panels.

Refer to your specific uB model instructions which specify if the CJC connection must be enabled for the model (some modules will require this connection, while others do not). You must also enable or disable linking for a channel, which is required to setup and configure a module for use on this carrier. Setting the channel BLE switch ON will enable you to link to the installed uB module in that socket via Bluetooth wireless technology from your smartphone or tablet (set OFF to block access). Refer to the following figure.



## Input Connections

One or two uB input modules plug directly into sockets on this carrier and are retained by metal spring clips. Input connections are wired to carrier terminals in the same fashion as input connections to uB modules when mounted on standard uB back-panels. Please refer to the following model-specific instructions for detailed microBlox® information on input connections for your uB model or back-panel. Be sure to check if your input module requires CJC to be enabled or disabled and set the CJC switch accordingly (see below).

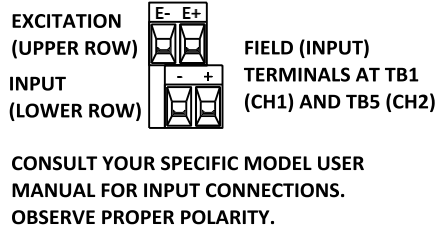
REFERENCE	DESCRIPTION
8501-037	uB31 & uB41 Voltage Input User Manual
8501-040	uB30 & uB40 mV Input User Manual
8501-041	uB32 DC Current Input User Manual
8501-042	uB42 DC Current Input w/2-Wire Excitation User Manual
8501-043	uB34 2/3-Wire & uB35 4-Wire RTD Input User's Manual
8501-044	Introduction to Agility Configuration Tool for microBlox®
8501-047	uB37 & uB47 TC Input User Manual
8501-050	uB04/uB08/uB16 Back-Panel User Manual

TB1 (channel 1) and TB5 (channel 2) along the bottom edge of this carrier carries the field INPUT ± (lower row), and EXC ± (back row) connections for the channel. Refer to your module instructions and observe proper polarity when making field input connections.



**Input Connections**

Field inputs are individually isolated--Be sure to ground your inputs as shown in their respective connection drawings (refer to your uB module manual).



**REQUIRED CJC SWITCH SETTING**

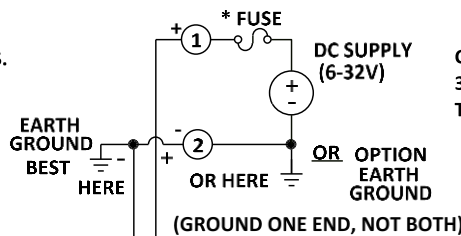
MODEL	CJC SETTING
uB31 & uB41	ON or OFF
uB30 & uB40	SET CJC ON
uB32 & uB42	ON or OFF
uB34 & uB35	SET CJC OFF
uB37 & uB47	SET CJC ON

**Power Connections**

Connect a DC power supply from 6-32V as shown in the next drawing. Observe proper polarity (input power is safety isolated and reverse-polarity protected to 60V). For supply connections, use 14 AWG wire rated for at least 85°C. Do not exceed 36V DC peak.

**POWERING THE uBTA-P-2x CARRIER**

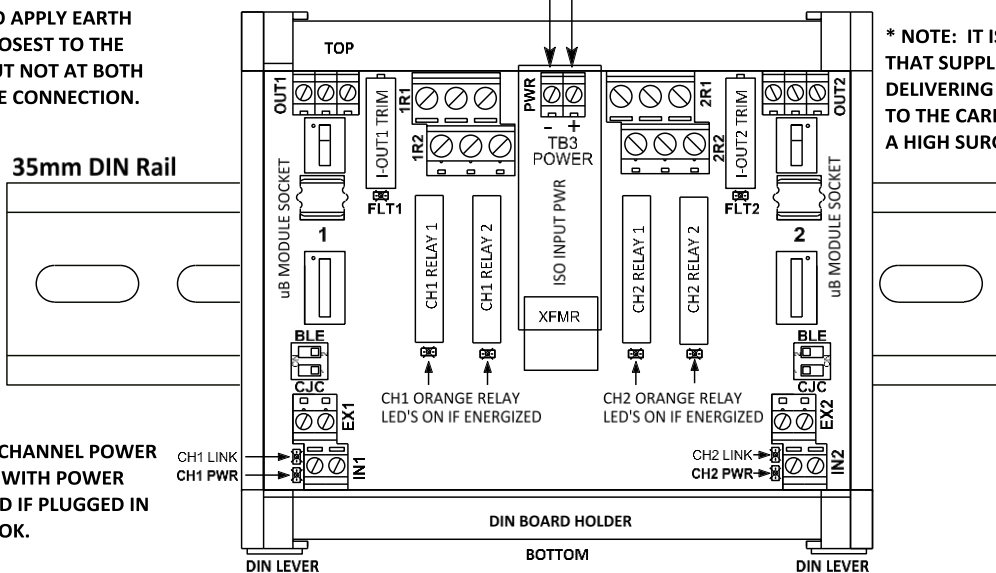
UNIT IS DC-POWERED ONLY AT 6 TO 32V DC. POWER INPUT IS ISOLATED FROM I/O AND RELAY CIRCUITS.



CAUTION: DO NOT EXCEED 36VDC, OR DAMAGE TO THE UNIT MAY RESULT.

IT IS BEST TO APPLY EARTH GROUND CLOSEST TO THE CARRIER, BUT NOT AT BOTH ENDS OF THE CONNECTION.

35mm DIN Rail



\* NOTE: IT IS RECOMMENDED THAT SUPPLIES CAPABLE OF DELIVERING MORE THAN 2.5A TO THE CARRIER BE FUSED WITH A HIGH SURGE TOLERANT FUSE.

THE GREEN CHANNEL POWER LED'S LIGHT WITH POWER APPLIED AND IF PLUGGED IN MODULE IS OK.

**IMPORTANT:** It is recommended that supplies capable of delivering more than 2.5A of power to the carrier be fused with a surge tolerant fuse. Unit includes a transient voltage suppressor clamp across its power input that will clamp overvoltage conditions. A sustained over-voltage condition from an unfused power supply could drive excessive fault current flow that can damage the carrier if allowed to exceed 3A.

## Earth Ground Connections

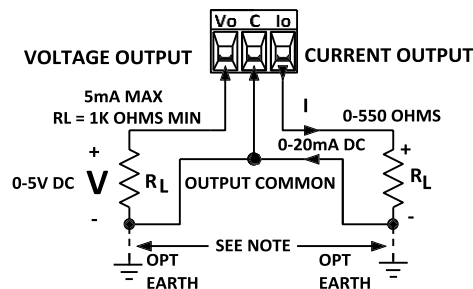
The unit housing is plastic and does not require an earth ground connection to itself. If the module is mounted in a metal housing, an earth ground wire connection to that metal housing's ground terminal (green screw) is usually required using suitable wire per applicable codes. Isolated circuits wired to this carrier are normally earth grounded. The carrier (host-side) can be earth grounded at either channel's analog output common. Carrier power is earth grounded at DC negative. Circuits wired to analog inputs (field-side) should be earth grounded as reflected in their connection diagrams. The ground connections noted are recommended for best results and help protect the unit and its isolated circuit by giving it a low impedance path to ground for shunting potentially destructive transient energy away from sensitive circuitry. See the Electrical Connection Drawings for recommended input, power, and analog output earth ground connections.

## Transmitter Analog Output Connections

This carrier provides both 0-5V and 0-20mA transmitter outputs for each channel. Note that these outputs share common between themselves and between output channels and an earth ground connection is normally made at one output common terminal.

### CHANNEL ANALOG OUTPUT CONNECTIONS

THE CHANNEL ANALOG OUTPUT TERMINALS ARE LOCATED ALONG THE TOP EDGE OF THE PANEL AT TB4 (CHANNEL 1) AND TB7 (CHANNEL 2). NOTE THAT ANALOG OUTPUTS SHARE COMMON AND A CONNECTION TO EARTH GROUND IS USUALLY MADE AT THIS TERMINAL.

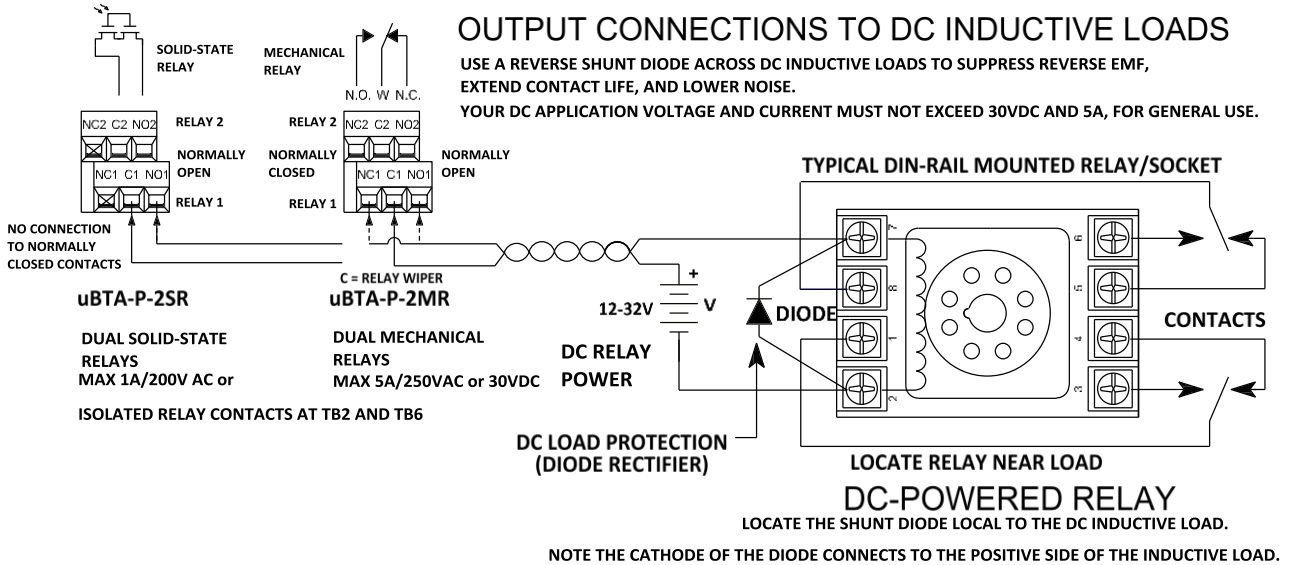
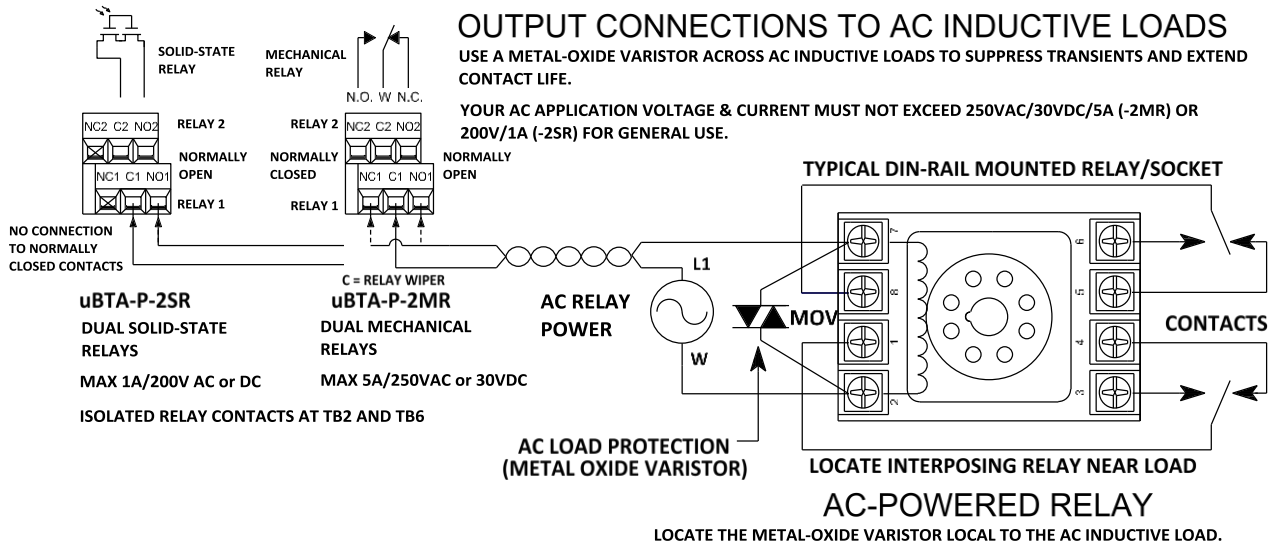


NOTE: IT IS BEST TO EARTH GROUND THE OUTPUT CIRCUIT LOCAL TO THE PANEL AND A PANEL EARTH GROUND CONNECTION CAN BE MADE AT ANALOG OUTPUT COMMON OF EITHER CHANNEL. AVOID MAKING MORE THAN ONE CONNECTION TO EARTH GROUND AT DIFFERENT POINTS.

**Note – For 4-20mA Transmitter Output:** The alarm carrier normally requires that input modules scale their input range to 0-5V for use on this carrier, and this will drive 0-20mA at the carrier's current output. If your application requires a 4-20mA current output, you may use the I/O Scaling function of the Agility mobile app to scale your module's input range to 1-5V output instead of 0-5V, and this will produce 4-20mA from the alarm carrier (note that the tandem voltage output of the carrier also becomes 1-5V, not 0-5V). The Agility App can also scale this for you if you select 4-20mA as an output type option under the uBTA Alarm tab.

## Interposing Relay Connections

If you need to raise your control capability and drive larger loads with load voltages and/or current demands that are greater than the rated capacity of this unit's mechanical or solid-state outputs, then you may choose to drive a higher capacity interposing relay that connects to the load, in similar fashion to the following figures (be sure to also include the inductive load protection at your load as shown):



**IMPORTANT:** Because the solid-state relay of the uBTA-P-2SR is both AC and DC rated, it is not possible to also include contact protection in the relay (a diode for DC, a MOV for AC), and this protection is best placed at the load as shown above. You should include this protection in your installation when switching inductive loads, or damage to the relay may occur.

## Add Contact Protection When Switching Inductive Loads

If your alarm relays are controlling inductive loads or driving interposing relay coils, then it is recommended that you add additional protection local to the inductive load or interposing relay as shown in the above figures (these carriers do not already include this protection). For DC loads, this protection typically takes the form of a diode placed in reverse of normal current flow through the load, but right at the load terminals (see this protection illustrated in the prior figure for driving an interposing relay where it is placed across the terminals of the interposing relay coil). When choosing this protection, it is recommended that you select a diode with an inverse voltage rating at least twice the load voltage, and a continuous current rating greater than your load current. The purpose of this diode is to squelch the high reverse voltage that develops in the coil when current through the coil is switched OFF. By placing it local to the load, it prevents this switching transient from being distributed along the wiring to the unit which could also inductively couple noise into adjacent circuits and will raise emissions. It also helps protect and extend the life of the relay contacts or the switch controlling the load. For more information on this protection, please refer to Acromag Application Note 8501-088 available for download at [www.acromag.com](http://www.acromag.com).

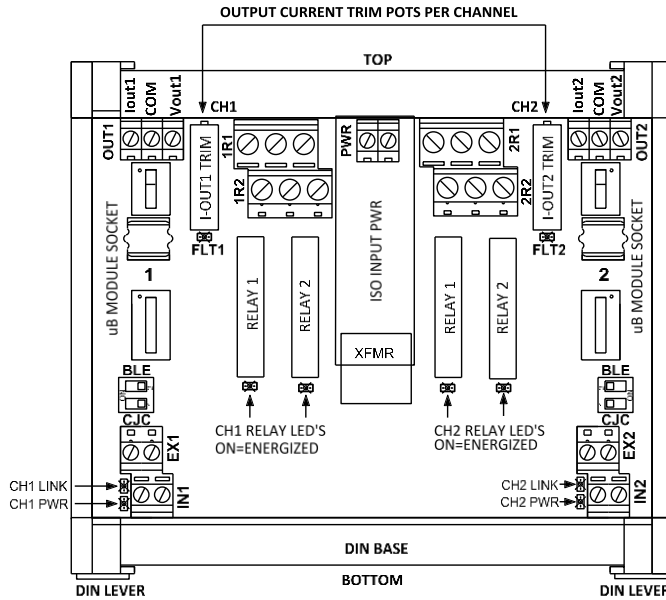
## Optional Output Current Trim Adjustment

**IMPORTANT:** Current adjustment has already been done at the factory using precision instruments and should not be attempted in the field unless fine accuracy can be assured (precision load, DVM, input source, etc.). Otherwise, you may make the current output less accurate.

This carrier includes both an analog voltage (0-5V) and current output (0-20mA) for each channel. The voltage output is driven directly via the corresponding plug-in uB module, while the carrier includes voltage to current conversion on-board to also drive 0-20mA from the 0-5V provided by the module. Normally, current output will not require trim adjustment, except perhaps to precisely set the output to tighter accuracy or to correct for long-term component aging. A 15-turn mechanical trim pot is included in the output circuit to fine tune the full-scale 20mA output with 5V full-scale from the module. It provides roughly  $\pm 0.08\text{mA}$  of adjustment around 20mA and is accessible with a small screw-driver along the top (output) edge of the carrier as shown in the drawing below. If your full-scale current output is not within  $\pm 0.1\%$  of 20mA, you may utilize this trim pot to make fine adjustments to its output current at full-scale input (with 5V full-scale output from module).

Refer to the figure below to locate this adjustment screw. Turn the pot screw clockwise to increase the output current at full-scale, and counter-clockwise to reduce the full-scale current. To monitor the output current, it is best to use a precision load resistor of greater accuracy than  $\pm 0.1\%$ , and measure output current as a function of the voltage drop across this resistor. For example, a  $250\Omega$  precision resistor will output 5V with precisely 20mA through it.

Note that you can optionally make this adjustment with power applied to the carrier and without plugging in a module by simply connecting a precision 5V full-scale signal to the channel's voltage output terminals (with no module plugged into carrier channel), then adjusting the corresponding current output to precisely 20mA by adjusting this pot as required. With a precision  $250\Omega$  load across the current output terminals, you would adjust this pot until you read precisely  $5V \pm 5\text{mV}$  on a DVM placed across the load resistor. Of course, setting the full-scale output this way would not additionally compensate for any potential module offset of up to  $\pm 0.05\%$  or  $\pm 2.5\text{mV}$  between different calibrated modules in the same socket.



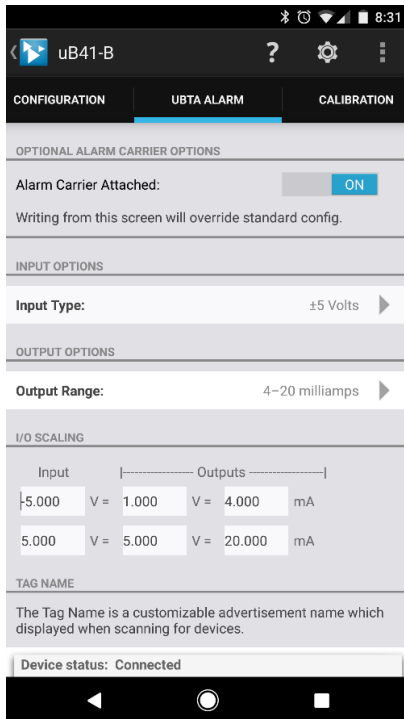
THE CURRENT OUTPUTS EACH INCLUDE 15-TURN TRIM POTS NEAR THE OUTPUT TERMINALS. THESE DO NOT NORMALLY NEED ADJUSTMENT, EXCEPT PERHAPS TO CORRECT FOR SMALL OFFSETS THAT MAY OCCUR AS PART OF CIRCUIT AGING, OR TO PRECISELY TUNE OUTPUT CURRENTS TO FINER ACCURACY. TURN THESE POTS CLOCKWISE TO INCREASE THE OUTPUT CURRENT AT FULL-SCALE, OR COUNTER-CLOCKWISE TO REDUCE THE OUTPUT AT FULL-SCALE.

THE CURRENT OUTPUTS ALSO INCLUDE RED FAULT LED'S BEHIND THE POTS THAT SIGNAL IF THE LOAD IS OPENED OR IF ITS IMPEDANCE IS TOO HIGH TO DRIVE IT FULL-SCALE.

## CONFIGURATION SOFTWARE

The alarm functionality of this carrier is setup inside the Bluetooth wireless technology-enabled module that is plugged into a channel for each module. You may configure alarm operation via our Agility mobile app and a Bluetooth wireless technology link to your Android or iOS smartphone or tablet. The Agility software can be downloaded free of charge from our web site at [www.acromag.com](http://www.acromag.com).

## Quick Overview



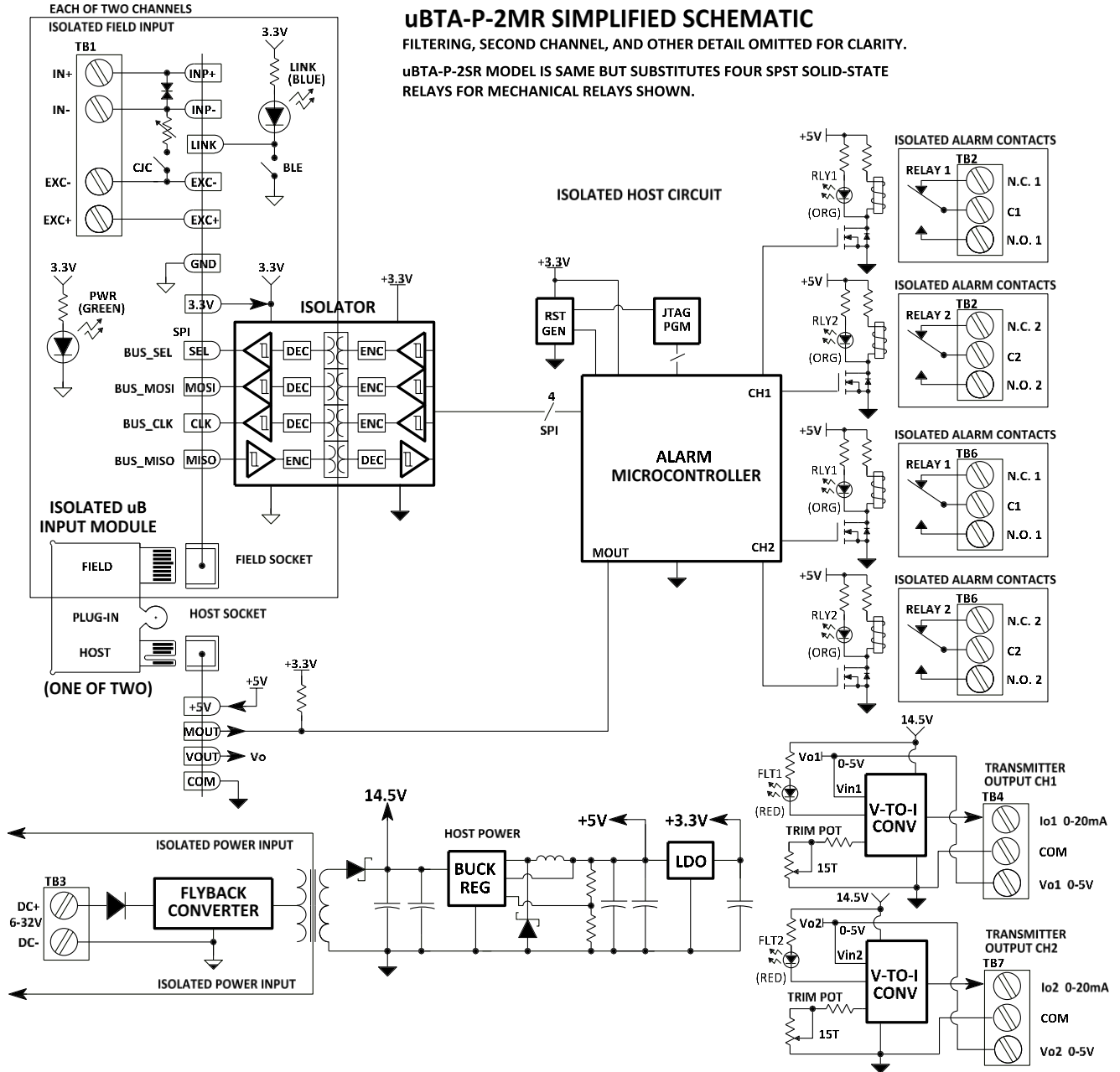
The screen at left is the uBTA Alarm configuration screen of the Agility mobile app. To configure a uB input module for installation in the alarm carrier, select the uBTA Alarm tab and drag the “Alarm Carrier Attached” switch right to ON as shown. Scroll down the page to complete the Alarm configuration.

This carrier provides two independent alarm relays for the input module and one or both relays may be configured as either a high, low, or window alarm, each with its own dead-band control using the screen at left (scroll down). You can set limits for each relay and/or specify a Reverse Acting alarm if you want fail-safe alarm action (failsafe refers to matching the alarm state of the contacts to the power-off state). Note that a window alarm may be configured for either relay and would trip for any input level outside the window defined by the high and low values specified for the relay (see Alarm operation on page 15). Orange Relay LED’s on the unit indicate the relay energized condition.

For complete information on Agility, please refer to its instruction manual 8501-044, available for download from our web site at [www.acromag.com](http://www.acromag.com).

**TECHNICAL REFERENCE**

**Block Diagram**





## How It Works

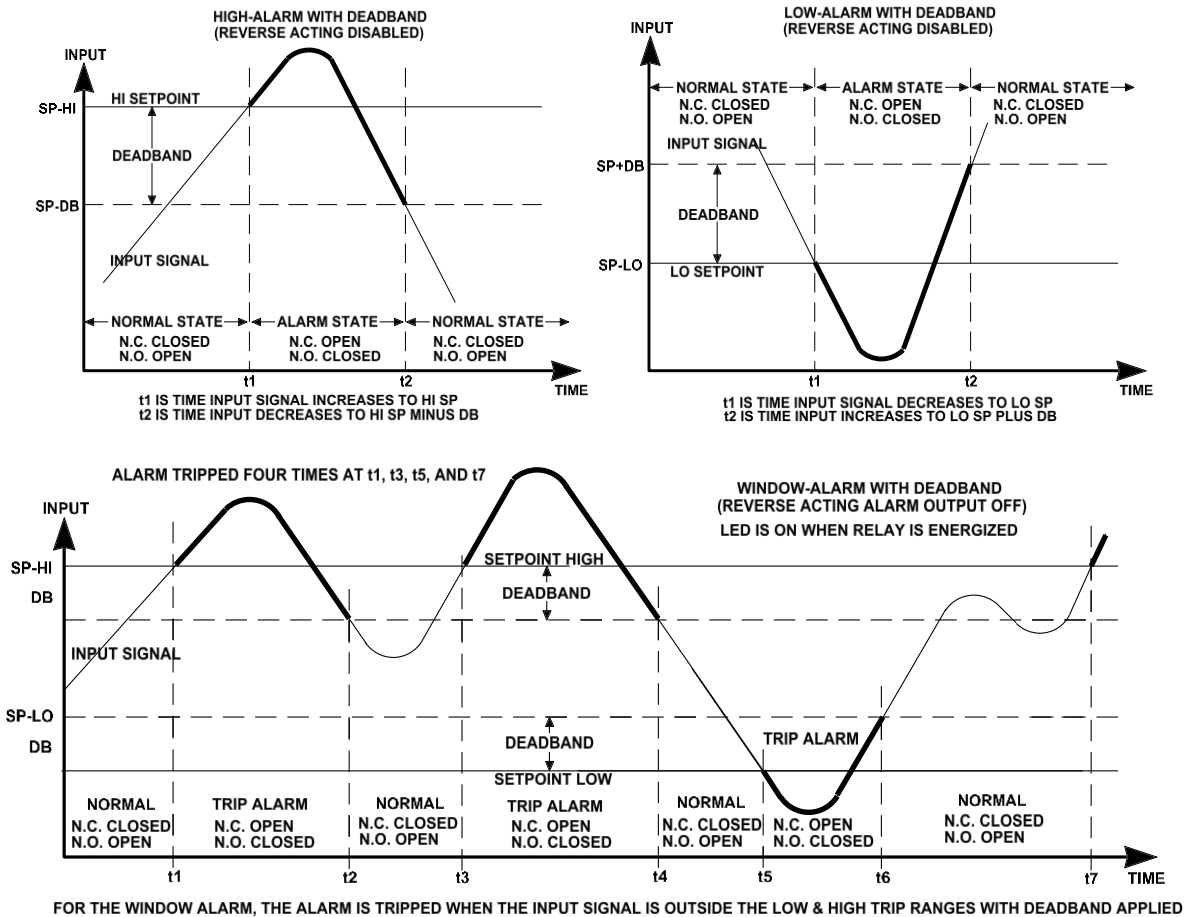
### Key Points of Operation

- Isolated 6-32V DC Powered carrier for one or two 5V powered modules.
- Two Relays per channel with one alarm per relay.
- Both voltage and current transmitter outputs per channel.
- Input, Output, Power, Relays, and relay contacts are isolated from each other.

A microBlox® input module is captively-plugged into a carrier socket. The carrier drives isolated 5V power to the module from an isolated flyback converter on-board that operates from 6-32V. The carrier receives a 0-5V output signal from the module which is isolated from and proportional to the module's input signal. A local microcontroller on the carrier handles the alarm functionality of the carrier. It retrieves alarm configuration information from the module via its isolated serial bus. Alarm configuration parameters are set inside the module via a Bluetooth wireless technology link to the module from a smartphone or tablet using the Acromag Agility mobile app. The carrier includes separate analog output terminals for module output voltage (0-5V/5mA), and locally derived current output (0-20mA/550Ω). Each carrier channel includes dual FORM C (SPDT) mechanical relay contacts, or dual FORM A (SPST) solid-state relay contacts depending on the model. A 15-turn mechanical pot on the carrier allows fine adjustment of its corresponding current output for long-term maintenance purposes or to correct for circuit aging. Refer to the block diagram above to gain a better understanding of how this carrier works.

## Alarm Operation

This product supports dual limit alarms or dual window alarms per channel. Refer to the following figures to understand how the limit and window alarms operate:





**TROUBLESHOOTING**

**Diagnostics Table**

*Before attempting repair or replacement of this carrier, be sure that all installation and configuration procedures have been followed and that the carrier is wired properly. Verify that 6-32V power is applied to the carrier. Verify that any input module plugged into this carrier is also operating properly.*

*If you still have a problem after checking your power, your wiring, and your module, and after reviewing this information, or if other evidence points to an unknown problem with the carrier, an effective and convenient fault diagnosis method is to exchange the questionable carrier or carrier module with a known good unit.*

*Acromag’s Application Engineers can provide further technical assistance if required. Repair services are also available from Acromag.*

POSSIBLE CAUSE	POSSIBLE FIX
<i>Green RUN LED of Carrier Channel does not light...</i>	
Is Power ON at the Carrier? Is a module plugged in the carrier?	Check carrier power. Is Green PWR LED ON at the channel (module must be plugged in)?
The plug-in Module’s +3.3V rail drives this LED and has failed, or the carriers 5V power to the module has failed.	Check power to the carrier which drives 5V power to the module. The green LED is sourced by the module’s 3.3V rail. Check if the module is bad by plugging-in a known good module and/or swapping channels. Return failed modules for repair or replacement. If the module is good, the carrier’s power converter may be bad and you can return it for repair or replacement.
<i>Cannot Communicate with Module with Bluetooth wireless technology...</i>	
<i>Blue BLE LED of Carrier Channel does not light...</i>	
Is the BLE DIP switch for the channel set ON to enable Bluetooth wireless technology at the module?	Check the BLE DIP switch of the channel. Setting it ON turns the blue BLE LED ON and allow you to link to the plugged-in module at that channel to use the Agility mobile app for alarm reconfiguration.
<i>Unit Fails to Start-up or Initialize...</i>	
Carrier input power voltage is below 6V, or the input supply has current-limited below twice the plug-in module current draw and has shut down.	Check your input power voltage and capacity and make sure that it is at least 6V and of sufficient current capacity (select a current capacity at least twice the max current draw of your application).
<i>Input Polarity is Wrong...</i>	
Are your input terminals reversed?	Check your input (field) wiring and observe proper polarity. Current is input and voltage is positive at the IN+ terminal. Current is returned and voltage is negative at IN-.
<i>Your uB Module Does Not Appear to Work in This Carrier</i>	
Is your module a Model uB45-B? Is your module setup to drive 0-5V output?	The uB45-B frequency input model is not compatible with this carrier for alarm functions (it can however be used as a voltage and current transmitter).
Is your module Bluetooth wireless technology-enabled?	Only uBxx-B models with Bluetooth wireless technology may be used in this alarm carrier. Optionally, for transmitter-only operation, fixed range uB models with 0-5V outputs may be used to convert the module output voltage to current.
<i>Alarm Contacts are “Chattering” or Alarm LED is blinking...</i>	
Have you applied dead-band correctly?	Increase alarm dead-band setting (Refer to Alarm Operation on Page 15 to see how dead-band can combat chatter).

**TROUBLESHOOTING****Diagnostics Table**

POSSIBLE CAUSE	POSSIBLE FIX
<i>Output Signal Appears Noisy or Unstable...</i>	
Is the uB module fully inserted into the carrier socket?	Check that the module is fully plugged into its socket. Note that uB45-B models are not compatible with this carrier for alarms, but permissible for transmitter functionality.
Have you grounded your input signal? Ungrounded I/O requires earth ground connection as noted in the module specifications.	Earth ground keeps isolated signals from floating and provides a safe shunt path for destructive transient energy. If your input source is not already earth grounded, then refer to its connection diagram and apply earth ground as noted (typically to the IN-terminal, see module wiring specific to your model). Similarly, transmitter outputs are normally grounded at the output common terminal of either channel.
Voltage Output is noisy	The voltage output of this carrier is driven directly by the plug-in module. If noisy, the field input signal may be floating or is not earth grounded, or perhaps the output is not earth grounded.
Check CJC Setting	Refer to your module specifications and determine the required CJC status for your model. Enable or disable CJC as required for your module by setting the channel CJC DIP switch accordingly.
Voltage Output is Over-Loaded	The 0-5V output can only drive up to 5mA into loads greater than or equal 1KΩ.
Current Output cannot drive full-scale current of 20mA. Is your red fault LED ON?	Your output load resistance may be greater than 550Ω. If load resistance is correctly 550Ω or less, then the carrier's 14.5V rail may have failed or has fallen out of regulation and the carrier can be returned for repair or replacement.

**Service & Repair Assistance**

Plug-in modules are encapsulated and cannot normally be repaired, except for possible reconfiguration and factory reprogramming. The carrier itself contains solid-state components and requires no maintenance, except perhaps for periodic cleaning. Additionally, the carrier plastic is not meant to be snapped apart and requires a special tool to do so. It is recommended that a non-functioning carrier be returned to Acromag for repair or replacement. Acromag has automated test equipment that thoroughly checks and calibrates the performance of each unit, and can restore or update firmware if needed. Please refer to Acromag's Service Policy and Warranty Bulletins, or contact Acromag for complete details on how to obtain repair or replacement.

## SPECIFICATIONS

### Model Number

**uBTA-P-2MR:** Dual Trx/Alarm/Mechanical Relays.

**uBTA-P-2SR:** Dual Trx/Alarm/Solid-State Relays.

These carriers are normally DIN-Rail mounted, and contain two microBlox® module channels to provide optional alarm and transmitter functionality to Bluetooth wireless technology-enabled modules of the microBlox® I/O family. Refer to the uBTA-P-1x models for single-channel versions of this same product.

The model “uB” prefix denotes this as a member of the popular Acromag microBlox® family, while “TA” denotes Transmitter/Alarm, its “-P” suffix denotes a Panel type carrier, the trailing “-2” suffix denotes dual microBlox® channels, while “MR” denotes Mechanical Relay Outputs (“SR” denotes Solid-state Relay outputs). Both versions of this carrier are DC powered and include CE & UL/cUL Class I, Division 2 Approvals.

Carriers are intended to be mounted on standard 35mm “T” Type DIN rail. The configuration of the alarm functionality for modules on this carrier will require an Android or iOS Bluetooth connection from your smartphone or tablet running our free Agility Wireless App to the Bluetooth module plugged into the carrier channel (linking for the channel must also be enabled).

### Analog (Field) Input

*The input to this carrier is to the uB input module plugged into it. Refer to your module’s instructions for detailed input and connection specifications.*

*Isolated Field input terminals are located at TB1 (channel 1) and TB5 (channel 2).*

**Accuracy:** Better than  $\pm 0.05\%$  of span typical relative to the installed module plus an additional  $\pm 0.05\%$  of span relative to this carrier, for a net combined accuracy of  $\pm 0.1\%$  of span. This includes the effects of repeatability, terminal point conformity, and linearization, but does not include sensor error.

Input (field) specifications are specific the microBlox® input module plugged into the carrier channel. Refer to your module instructions for detailed field connections to the module. The following uB models are compatible with this alarm carrier (the uB45-B frequency model is not compatible with this carrier for alarm functionality, but permissible for transmitter operation):

#### uB Plug-In Input Models That May Utilize this Alarm Carrier

Model	Nominal Module Inputs	Module Output
uB31-B/uB41-B	$\pm 1V$ to $\pm 60V$	0-5V
uB30-B/uB40-B	$\pm 10mV$ to $\pm 100mV$	
uB32-B/uB42-B	4-20mA/0-11.17mA DC	
uB34-B/uB35-B	2/3/4-Wire Pt RTD	
uB37-B/uB47-B	J/K/T/R/S Thermocouple	

**Note:** A uB module must be configured for a 0-5V output range and any input subrange of the nominal input range must be scaled to 0-5V when used in this carrier. For alarm functionality, only Bluetooth wireless technology enabled uB models can be used, as Bluetooth wireless technology reconfiguration is required. For transmitter-only functionality, fixed range uB models with 0-5V output signals may be used to output voltage (0-5V) and current (0-20mA) on this carrier.

Module field inputs, carrier power, and carrier transmitter outputs must be wired and configured for their I/O type and range for use on this carrier (see Electrical Connections section for details).

**I/O Cable Length:** For rated performance, I/O port interface cables should not exceed 30m in length.

## Alarm Relay Outputs

### Mechanical Relay Model (-2MR Suffix Model)

*Contains two independent electromechanical relays per channel. Each relay may have its own set-point, dead-band, and reverse acting status setting. A High or Low limit or a window Alarm may be configured for each relay.*

### Solid-State Relay Model (-2SR Suffix Model)

*This model contains two independent solid-state relay contacts per channel. Each relay may have its own set-point, dead-band, and reverse acting status set. A High or Low limit or a window Alarm may be configured for each relay.*

### Both uBTA-P-2x Models

*Alarm relay outputs are located at TB2 (channel 1) and TB6 (channel 2).*

**Type:** Dual 1 FORM C (Two SPDT, Normally Open and Normally Closed contacts).

**Ratings:** 5A, 250VAC/30VDC, no load deration required over temperature.

**Minimum Switching Load:** 100mA, 5VDC.

**Electrical Life:** 50x10<sup>3</sup> operations minimum, N.O. contact; 30x10<sup>3</sup> operations minimum, N.C. contact at 5A, 250VAC/30VDC resistive.

**Mechanical Life:** 10x10<sup>6</sup> operations minimum.

**Contact Material:** Silver-tin oxide (AgSnO<sub>2</sub>).

**Dielectric Strength:** Between open contacts: 1000VACrms, 50-60Hz, 1 minute, 10mA detection current; Between coil and contacts: 4000VAC, 50-60Hz, 1 minute, 10mA detection current.

**Type:** Dual 1 FORM A (Two SPST, Normally Open contacts).

**Ratings:** Solid-state relays are AC and DC rated for up to 1A and 200Vpk at 25°C.

Due to greater temperature inside the instrument enclosure, reduce the maximum relay load current above 10°C ambient according to the equation:

Load\_Current = 1.08A - (Ambient°C) \* (0.42/50), up to 75°C maximum ambient.

**IMPORTANT:** This solid-state output is AC and DC rated. As such, it does not include any switch protection for inductive loads—You must add protection for inductive loads or damage to this output switch could result (see Add Contact Protection when Switching Inductive Loads).

**Contact Resistance:** 0.7Ω typical, 1.1Ω maximum.

**Off-State Leakage Current:** 10uA maximum.

**Relay Response Time:** Relay contacts will switch within 15ms (8ms typical) for an input step change from 10% of span on one side of an alarm level to 5% of span on the other side of the alarm level. Your relay response time will vary with your input module's bandwidth/response time. For 1KHz wide-bandwidth modules, this carrier will track a sinusoidal peak alarm up to 75Hz.

**Note (for Larger Relay Loads):** To control a higher amperage device, such as a pump, an interposing relay may be used (see Interposing Relay Connections).

**Note (for Output Protection):** External contact protection is required for use with inductive loads (see Contact Protection Connections). Failure to use this protection may reduce contact life, damage the unit, and increase emissions.

## Transmitter Outputs

### Voltage Output (each channel)

*Re-transmitted from module.*

Carrier channels may also function as a simple analog transmitter for simultaneous voltage and current output. Transmitter operation does not require Bluetooth wireless technology and supports any 0-5V output microBlox® model, which drives 0-5V and 0-20mA outputs on the carrier. Only Bluetooth wireless technology models are required to utilize carrier alarm capability, or to optionally scale a sub-range of the input to drive 0-5V output and 0-20mA on the carrier. Note that transmitter outputs share a common connection.

**Range:** 0-5V, equivalent to the microBlox® module output and retransmitted at the carrier output voltage terminals TB4-1,2 (CH1) and TB7-1,2 (CH2).

**Load:** 5V into 1KΩ minimum, per voltage channel.

**Accuracy:** ±0.05% of span typical (from module), or ±0.1% of 5V span, ±5mV maximum (module in carrier). Refer to your module specifications for details.

## Transmitter Outputs

### Current Output (each channel)

*Derived from plug-in module and transmitted from carrier.*

**Range:** 0-20mA/0-5V, 4-20mA/1-5V, output current at TB4-3 (CH1), TB7-3 (CH2), and current return at TB4-2 and TB7-2.

**Output Maximum:** 24mA typical.

**Load Resistance:** 0-550Ω minimum (20mA).

**Accuracy:** ±0.1% of 20mA span, or ±0.020mA maximum.

**Current Trim:** ±0.08mA adjustable via precision 15 turn Trim Pot per channel. Adjustment is not normally required, but useful for making fine output current adjustments or to correct for component aging at the channel (See Output Current Trim adjustment for instructions on making this calibration).

**Note for 4-20mA Current Output:** This alarm panel normally requires that input modules scale their field input to 0-5V output for use on this carrier, which produces 0-20mA at the carrier’s current output. If your application requires 4-20mA output instead of 0-20mA, you may use the I/O scaling function of the Agility mobile app to scale your module’s input range to 1-5V out instead of 0-5V, which produces 4-20mA at the current output (note the tandem voltage output from the carrier becomes 1-5V, not 0-5V). The App will also scale this for you if you select 4-20mA as an output type option under the uBTA Alarm tab.

## Controls

**LED Indicators**  
(Each Channel)

**Channel PWR (Green)** – ON indicates power is applied to the carrier and plugged-in uB module is operating normally (sourced from module 3.3V rail).

**Channel BLE (Blue)** – Channel Blue ON indicates Linking to channel module is enabled (via BLE DIP switch of channel, sourced from carrier).

**Channel Relay 1 (Orange)** – ON indicates first relay of channel is energized.

**Channel Relay 2 (Orange)** - ON indicates second relay of channel is energized.

**Channel Output Current Fault (Red)** – ON indicates a problem with the corresponding current output (i.e. load resistance too high or the load is open).

Set this DIP switch to the ON position (left) to allow Bluetooth wireless technology linking to the module plugged into the channel socket to reconfigure its alarm configuration.

**BLE DIP Switch**  
(Each Channel)

**CJC DIP Switch**  
(Each Channel)

Set this DIP switch to the ON position (left) to make a CJC connection at the input. Some models require CJC to be set ON or OFF depending on the model as follows (also consult your specific module instructions):

CJC	uB30/40	uB31/41	uB32/42	uB34/35	uB37/47
Set ON or OFF		√	√		
SET ON	√				√
SET OFF				√	

## Alarm Configuration

### Alarm Operating Types

Alarm functionality can only be configured via Bluetooth wireless technology from an Android or iOS smartphone/tablet with the Acromag Agility mobile app directed to the specific uB module plugged into the carrier socket.

**Dual Limit:** Limit alarms have a high and/or low set-point applied to an input channel (per relay). The relay will enter the alarm state when either the user-defined high or low set-point is exceeded and remains in alarm until the input has retreated past the set-point, plus any dead-band.

**Dual Window:** Window alarms have both high and low set-points defined on an input at a time (per relay). The alarm relay will enter the alarm state for levels outside the window and remain in alarm until the input signal has retreated inside the window inside the defined set-point limits, plus dead-band.

## Alarm Configuration

### Alarm Set-point

A high or low set-point (plus dead-band) may be assigned to each channel relay and is programmable over the entire input range of the plug-in module. In general, the relay will trip on an increasing signal for a high set-point, and on a decreasing signal for a low set-point.

### Alarm Dead-band

Dead-band is associated with each set-point level and programmable over the entire input range. Dead-band determines the amount the input signal must return into the “normal” operating range before the relay contact will transfer out of the “alarm” state. Dead-band is normally used to eliminate false trips or alarm “chatter” caused by fluctuations in the input signal near the set-point levels.

### Reverse-Acting Alarm Output (Failsafe/Non-Failsafe Operation)

**IMPORTANT:** Noise and/or jitter on the input signal has the effect of reducing or narrowing the dead-band region and may result in contact chatter—you may increase dead-band to squelch chatter (minimally set dead-band greater than channel accuracy). This is very important for mechanical relays because continued contact chatter will reduce the life of the relay contacts. For “Failsafe” operation, the relay is de-energized in the alarm state (i.e. reverse acting enabled). For Non-Failsafe operation, the relay is energized in the alarm state. Failsafe simply refers to matching the contact closure in alarm to that for power loss, while non-failsafe alarms use an alarm contact closure opposite to power loss conditions. You may select Reverse-Acting for an alarm to effectively achieve “fail-safe” operation as required (note that the uBTA-P-2MR models have both normally open and normally closed contacts).

## Power

Connect power at TB3-1 (+) and TB3-2 (-).

**CAUTION:** A terminal voltage at or above 6V min should be maintained to the unit during operation. Do not exceed 36VDC peak to avoid damage to the unit.

Observe proper polarity. Reverse voltage protection up to 60V is built-in. Your supply should be rated at twice the maximum current draw to allow for potential inrush current.

**Note:** It is recommended that supplies capable of supplying more than 2.5A to the carrier be fused with a surge tolerant fuse.

Connect 6-32V DC SELV (Safety Extra Low Voltage), up to 3.9W including modules. Your current draw is dependent on the carrier model, its relay type, whether you use the transmitter outputs, your plug-in module, and voltage level. You can calculate average power consumption by combining power items you are using and this applies quite well for voltages from 9-32V.

POWER ITEM	AVG REQD POWER	x2 CHANNELS
uBTA-P-2x Base Unit	0.33W	
Dual Mechanical Relays	0.37W	0.74W
Dual Solid-State Relays	0.17W	0.34W
5mA Voltage Output	0.07W	0.14W
20mA Current Output	0.36W	0.72W
Standard Module (<50mA)	0.28W	0.56W
uB42 (<120mA) Module	0.64W	1.28W

uBTA-P	BASE	RELAYS	V-OUT	I-OUT	uB41x2	uB42x2	Ptot
-2MR	0.33	0.74	0.14	0.72	<del>0.56</del>	<b>1.28</b>	<b>3.21</b>
-2MR	0.33	0.74	0.14	0.72	<b>0.56</b>	<del>1.28</del>	<b>2.49</b>
-2SR	0.33	0.34	0.14	0.72	<del>0.56</del>	<b>1.28</b>	<b>2.81</b>
-2SR	0.33	0.34	0.14	0.72	<b>0.56</b>	<del>1.28</del>	<b>2.09</b>

For current draw, divide Ptot (last column) by your supply voltage to get typical current draw. Multiply this current by 1.1 for maximum current draw, or multiply it by 1.2 for maximum current draw with a 6V supply. Current below is for a fully loaded carrier with fully loaded uB42 modules and standard modules.

## Power

POWER SUPPLY	uBTA-P-2MR	uBTA-P-2SR	uBTA-P-2MR	uBTA-P-2SR
	w/ uB42 Input Modules		w/ Standard Input Modules	
6V	642mA	562mA	498mA	418mA
9V	392mA	343mA	304mA	255mA
12V	294mA	258mA	228mA	192mA
15V	235mA	206mA	183mA	153mA
24V	147mA	129mA	114mA	96mA
32V	110mA	97mA	86mA	72mA

**Power Supply Effect:** Less than  $\pm 0.001\%$  of output span effect per volt DC change.

## Enclosure & Physical

Board is held in place by a plastic panel holder with an integrated DIN clip for mounting on 35mm “T-type” DIN rail.

**Dimensions:** Width = 102mm (4inches), Height = 72.0mm (2.83inches), Depth = 36mm (1.42inches w/o modules). Refer to Mechanical Dimensions drawing. Note that the plug-in module extends approximately 1.4” above the carrier panel.

**I/O, Power, and Relay Connectors:** Fixed type terminal blocks rated for 12A/250V; AWG #28-16, stranded or solid copper wire.

**Carrier Material:** Self-extinguishing polyamide, UL94 V-0 rated, color light gray. General purpose NEMA Type 1 enclosure.

**Circuit Board:** Military grade fire-retardant epoxy glass per IPC-4101/98.

**DIN-Rail Mounting:** Unit is normally mounted to 35x15mm, T-type DIN rails. Refer to the DIN Rail Mounting & Removal section for more details.

**Unit Weight:** 0.35 pounds (0.16 Kg).

## Environmental

*These limits represent the minimum requirements of the applicable standard, but this product has typically been tested to comply with higher standards in some cases.*

**Operating Temperature:** -40°C to +75°C (-40°F to +158°F).

**Storage Temperature:** -40°C to +85°C (-40°F to +185°F).

**Relative Humidity:** 5 to 95%, non-condensing.

**Isolation:** Input (field) isolation is provided by the input module (sold separately). The input, transmitter outputs (both channels together in common), input power, and relay outputs (including contact-to-contact) are all isolated from each other for common-mode voltages up to 250VAC, or 354V DC off DC power ground, on a continuous basis (will withstand 1500VAC dielectric strength test for one minute without breakdown). This complies with test requirements of ANSI/ISA-82.01-1988 for voltage rating specified.

**Installation Category:** Suitable for installation in a Pollution Degree 2 environment with an Installation Category (Over-Voltage Category) II rating per IEC 1010-1 (1909).

**Shock & Vibration Immunity:** Conforms to: IEC 60068-2-6: 10-500 Hz, 4G, 2 Hours/axis, for sinusoidal vibration; IEC 60068-2-64: 10-500 Hz, 4G-rms, 2 Hours/axis, for random vibration, and IEC 60068-2-27: 25G, 11ms half-sine, 18 shocks at 6 orientations, for mechanical shock.

## Environmental

### Electromagnetic Compatibility (EMC)

#### **Minimum Immunity per BS EN 61000-6-1:**

- 1) Electrostatic Discharge Immunity (ESD), per IEC 61000-4-2.
- 2) Radiated Field Immunity (RFI), per IEC 61000-4-3.
- 3) Electrical Fast Transient Immunity (EFT), per IEC 61000-4-4.
- 4) Surge Immunity, per IEC 61000-4-5.
- 5) Conducted RF Immunity (CRFI), per IEC 61000-4-6.

#### **This is a Class B Product with Emissions per BS EN 61000-6-3:**

- 1) Enclosure Port, per CISPR 16.
- 2) Low Voltage AC Mains Port, per CISPR 14, 16.
- 3) DC Power Port, per CISPR 16.
- 4) Telecom / Network Port, per CISPR 22.

## Agency Approvals

**Electromagnetic Compatibility (EMC):** CE Marked, per EMC Directive 2014/30/EU.

**FCC Conformity:** This device complies with Part 15, Class B of the FCC rules.

**Safety Approvals:** UL Listed (USA & Canada). Hazardous Locations – Class I, Division 2, Groups A, B, C, D Hazardous Location or Nonhazardous Locations only. These devices are open panel type circuits that are intended to be installed in an enclosure suitable for the environment.

**ATEX / IECEx Certified:** ATEX Certified for Explosive Atmospheres per ATEX Directive 2014/34/EU which complies with standards IEC 60079-0 Edition 6, IEC 60079-15 Edition 4, EN 60079-0:2012+A11:2013, and EN 60079-15:2010.

⊕ II 3 G Ex nA nC IIC T4 Gc -40°C ≤ Ta ≤ +75°C (For model uBTA-P-2MR)

⊕ II 3 G Ex nA IIC T4 Gc -40°C ≤ Ta ≤ +75°C (For model uBTA-P-2SR)

DEMKO 18 ATEX 2086X IECEx UL 18.0092X

**X = Special Conditions:**

- 1) The equipment shall only be used in an area of not more than pollution degree 2, as defined in EN/IEC 60664-1.
- 2) The equipment shall be installed in an enclosure that provides a degree of protection not less than IP 54 and only accessible with the use of a tool in accordance with EN/IEC 60079-15.
- 3) Transient protection shall be provided and set at a level not exceeding 140% of the peak rated voltage value at the supply terminals to the equipment

## Reliability Prediction

### **Reliability Prediction**

**MTBF (Mean Time Between Failure):** MTBF in hours using MIL-HDBK-217F, FN2. Per MIL-HDBK-217, Ground Benign, Controlled, G<sub>B</sub>G<sub>C</sub>

uBTA-P-2MRx	MTBF (Hours)	MTBF (Years)	Failure Rate (FIT)
25°C	TBD hrs	TBD years	TBD
40°C	TBD hrs	TBD years	TBD
uBTA-P-2SR	MTBF (Hours)	MTBF (Years)	Failure Rate (FIT)
25°C	TBD hrs	TBD years	TBD
40°C	TBD hrs	TBD years	TBD



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## REVISION HISTORY

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The following table shows the revision history for this document:

Release Date	Revision	EGR/DOC	Description of Revision
05 Jun 2017	A	BC/MO	Updated Revision A Release.
27 NOV 2018	B	CAP/ARP	Added UL / ATEX / IECEX / FCC statements.

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