RETIRED

microBlox® Series
Model uBTA-H-1MR, uBTA-H-1SR, and uBTX-H-1
DIN Rail 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 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, 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-H-1MR	Combination Transmitter/Alarm Carrier for a single uB input module with dual SPDT mechanical relays.
uBTX-H-1	A Transmitter-Only Carrier for a single uB input module with both a 0-5V voltage output and a 0-20mA current output.
uBTA-H-1SR	Combination Transmitter/Alarm Carrier for a single uB input module with dual SPST AC/DC solid-state relays.

These carriers are used with Bluetooth wireless technology versions of Acromag microBlox® modules to build powerful alarms and voltage/current transmitters (input module not included, see below for compatible models). Modules are isolated input-to-output and these carriers add power isolation and alarm capability to the microBlox® module with two relays provided. A high or Low limit, or a window alarm, may be configured for each relay via Bluetooth wireless technology communication from your Android or iOS smartphone or tablet.

uB Input Models Supported (10/11 Bluetooth Wireless Technology Models)

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. 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. A single uB input module plugs into this carrier to build a

dual output alarm and voltage/current transmitter (uBTA models), or just a voltage/current transmitter (uBTX model). Different input types can be plugged into this carrier to form different alarm types, normally without recalibration. Like all microBlox® components, these carriers offer high immunity in harsh industrial environments, are CE and ATEX / IECEx compliant, and UL approved for installation in Class I, Division II hazardous locations.

Key Features

- **High-Density 22.5mm wide enclosure mounts on standard DIN rails and includes pluggable, front-facing terminals. Front-panel LED indicators for Bluetooth wireless technology link, power, and relays aide trouble-shooting.**
- **Field-pluggable microBlox® input modules (sold separately) allow you to change input types on this carrier, usually without recalibration. Modules are over-molded and RoHS compliant, and offer superior shock, moisture, and dust protection.**
- **Channel has dual alarm outputs that is configured using Bluetooth wireless technology. Two alarm 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:**
  Ⓔx II 3 G Ex nA nC* IIC T4 Gc -40°C ≤ Ta ≤ +75°C (* for Model uBTA-H-1MR)
  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.**
- **All I/O and power ports are transient protected.**
- **Wide-range DC powered from 6-32V and Bus Power Ready for optional clean wired power along the DIN Rail and/or Redundant Power Connection.**
- **High 1500VAC Safety Isolation: Field input, transmitter output, power, and relay contacts (including between contacts) are 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 & Vibration Immunity - 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 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

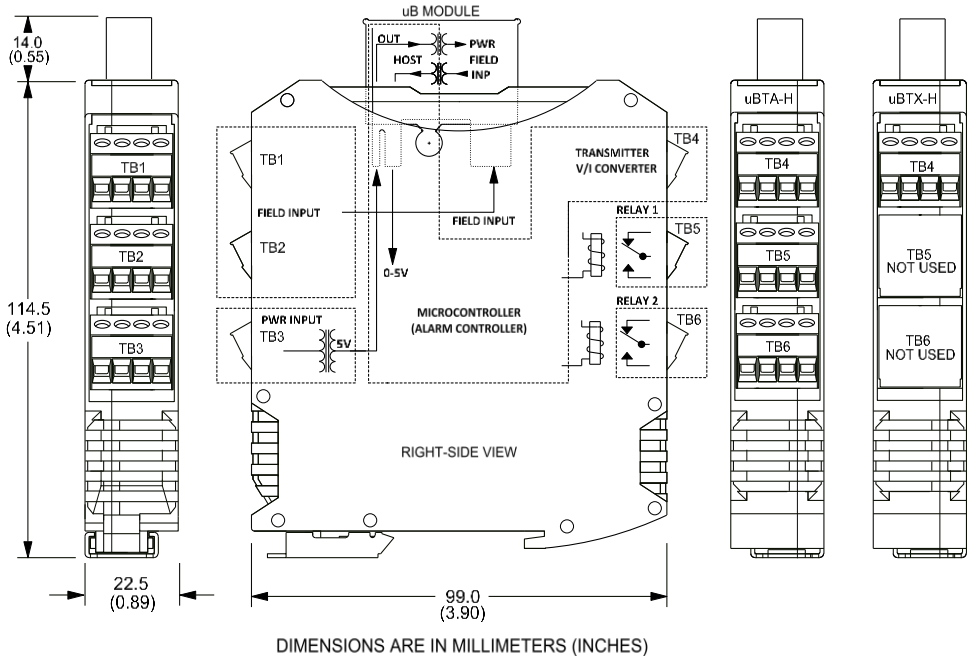
This carrier allows a single Bluetooth-enabled microBlox® input module to be plugged into its housing as shown at left and mounted on a T-type DIN rail. Carriers can mount side-by-side on 22.5mm centers and can also plug-together for modular expansion with a shared input power connection along the DIN rail. These alarm carriers support ten of eleven available uBxx-B input model types 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 separate isolated relay contacts (dual FORM C mechanical or dual FORM A solid-state relay contacts). The carrier also provides a wired interface for the module's 0-5V output and adds a tandem 0-20mA current output. Independent High/Low alarm levels or a window alarm may be configured for each relay. Alarm levels are configured in the captive Bluetooth wireless technology module via a smartphone or tablet and 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 output, and have any input sub-range scaled to 0-5V output. However, for transmitter-only operation, it will additionally support any uB input model that has 0-5V output, and will provide isolated power to the module, and drive separate transmitter outputs of 0-5V/5mA, or 0-20mA/0-550Ω.

Mechanical Dimensions

Units may be mounted to 35mm "T" type DIN rail (35mm, type EN50022), and side-by-side on 22.5mm (0.9-inch) centers.

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.*

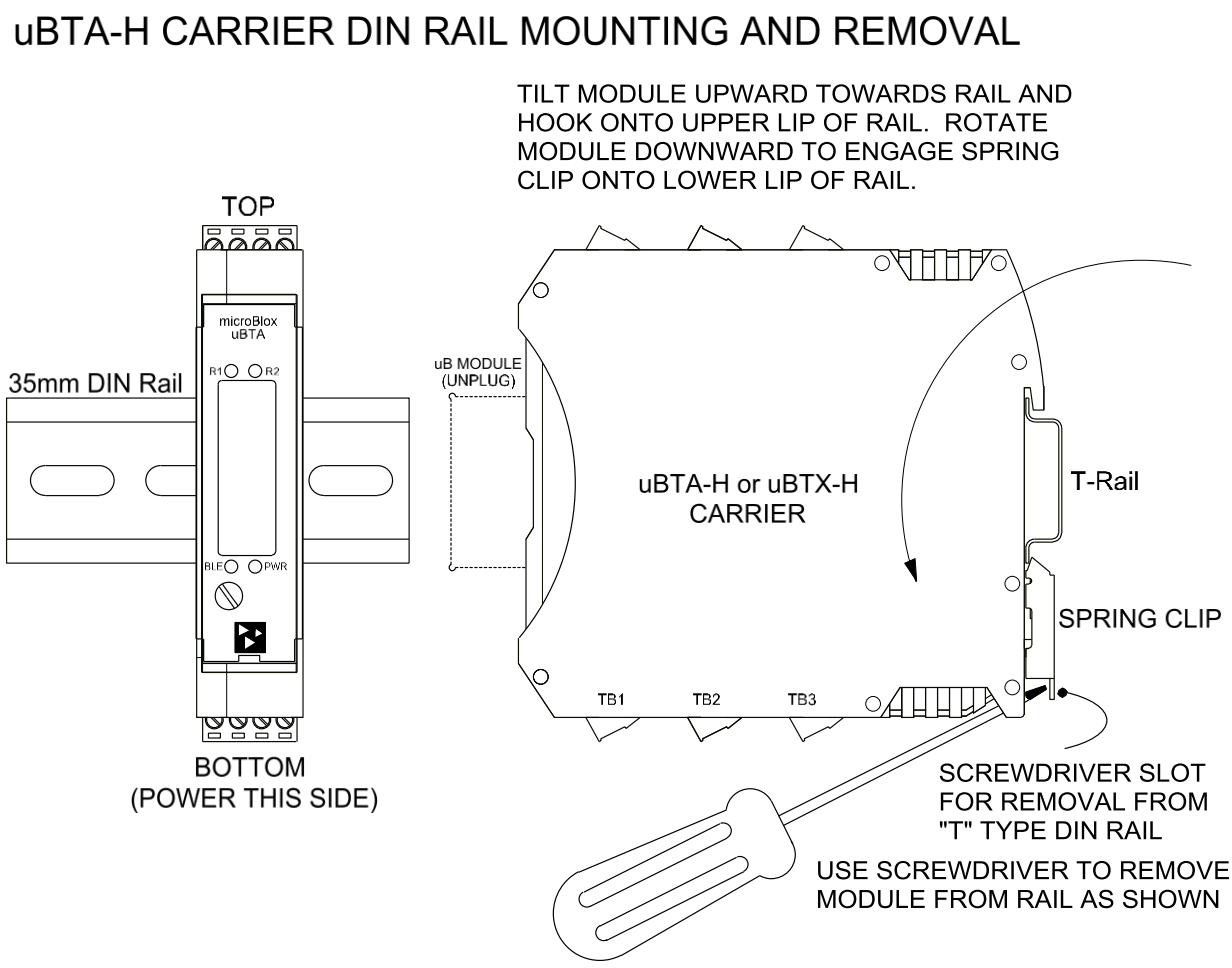


DIN Rail Mounting & Removal

When removing the carrier from the DIN rail, it is recommended that your uB input module be unplugged from the top of the carrier first. Refer to the figure below for attaching and removing the carrier from the DIN rail. The DIN rail clip located on the bottom side is spring-loaded. The opposite rounded edge at the bottom of the top side allows you to tilt the unit upward to lift it from the rail while prying the spring clip back with a screwdriver along the bottom as shown below.

To attach the carrier to T-type DIN rail, angle the top of the unit towards the rail and place the top groove of the carrier over the upper lip of the DIN rail. Firmly push the unit downward towards the rail until it snaps into place.

To remove it from the DIN rail, first separate the input and power terminal blocks (TB1-TB3) from the bottom side of the module to create clearance to the DIN mounting clip. You can use a screwdriver to pry the pluggable terminals out of their sockets. Next, while holding the carrier in place from above, insert a screwdriver along the bottom side path of the carrier to the DIN rail clip and use it as a lever to force the DIN rail spring clip down, while pulling the bottom of the carrier outward until it disengages from the rail. Then simply tilt the carrier upward to lift it off the rail.



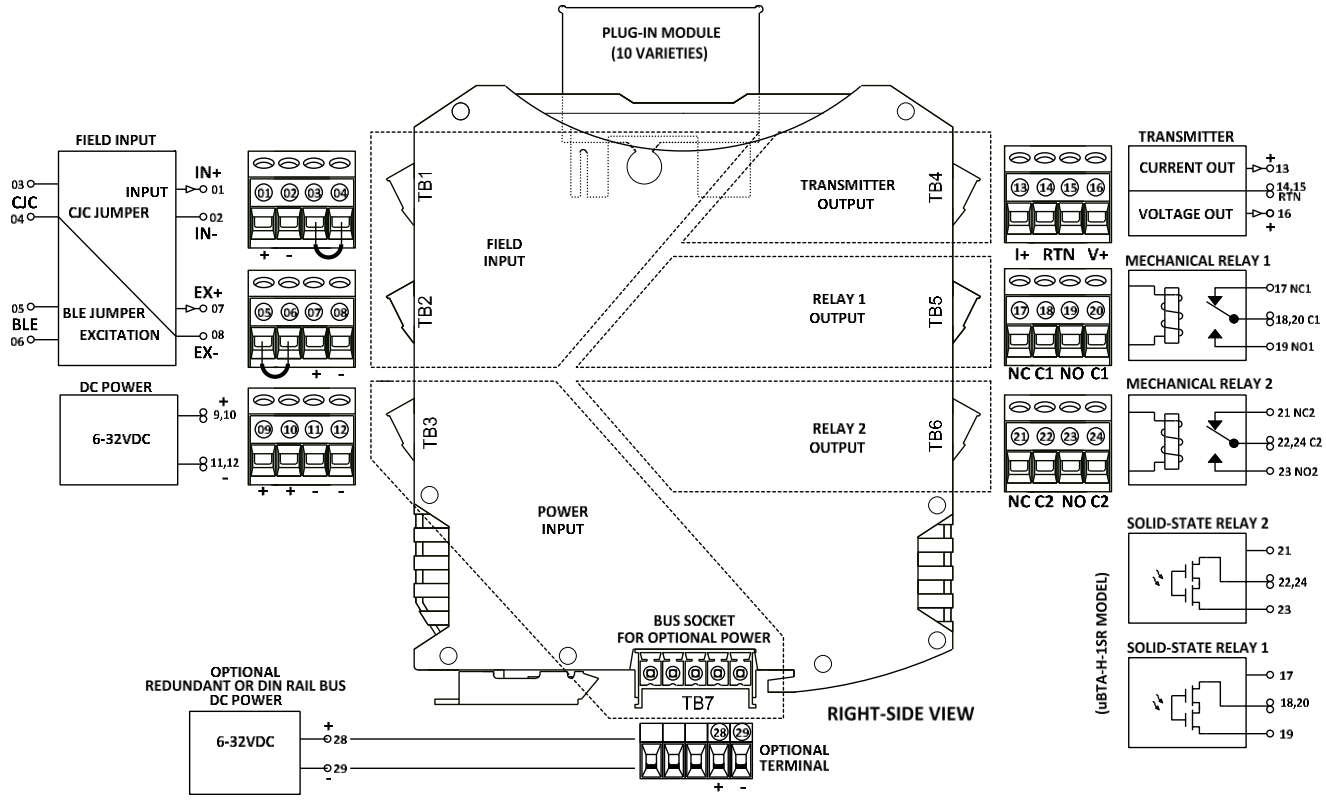
ELECTRICAL CONNECTIONS

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 14–26 AWG (2.5–0.14mm^2) 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). Terminals are pluggable and can be removed from their sockets by prying outward from the top with a flat-head screwdriver. 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 0.5-0.6nM 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.

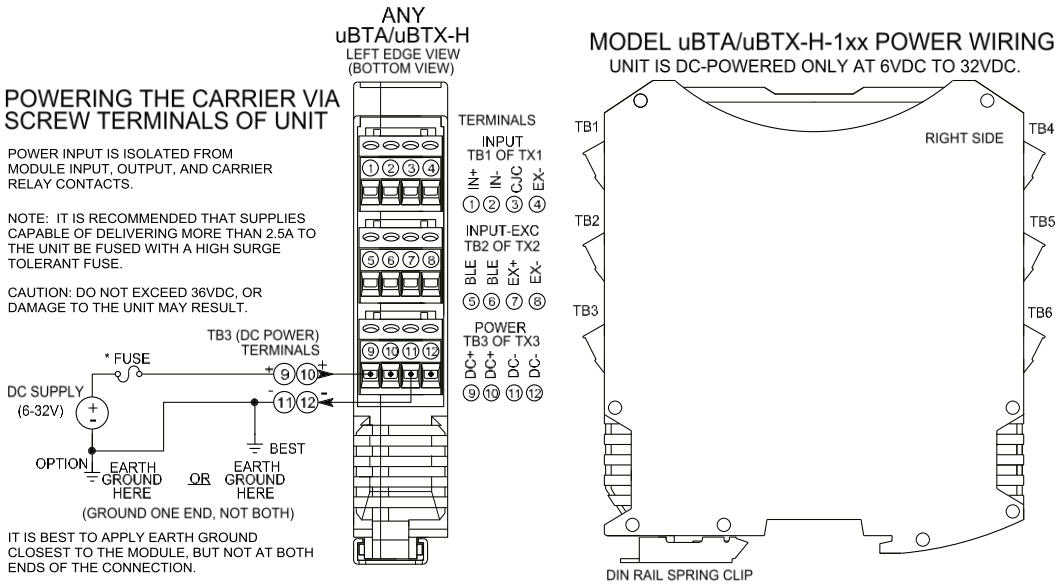
Isolation Barriers

uBTA-H-1MR Shown or uBTA-H-1SR



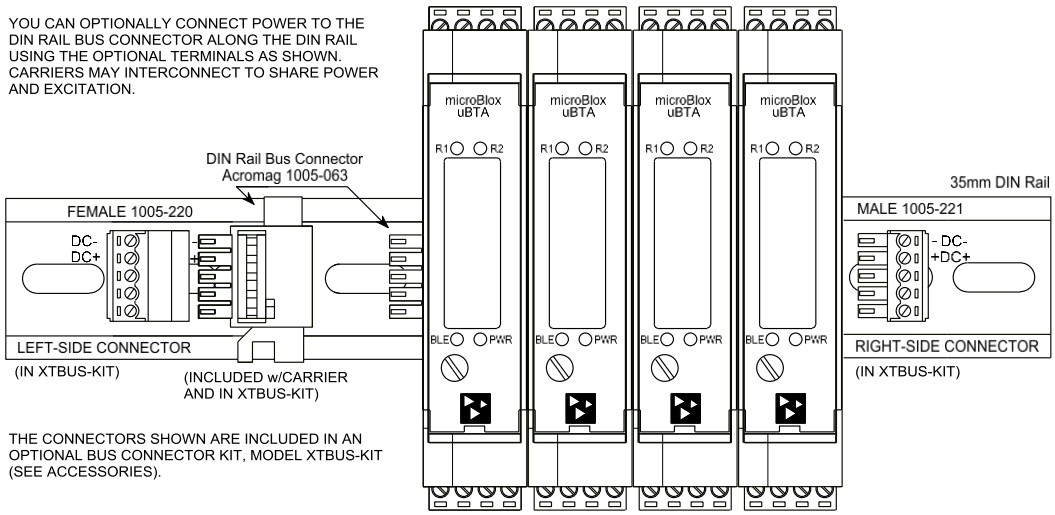
Power Connections

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



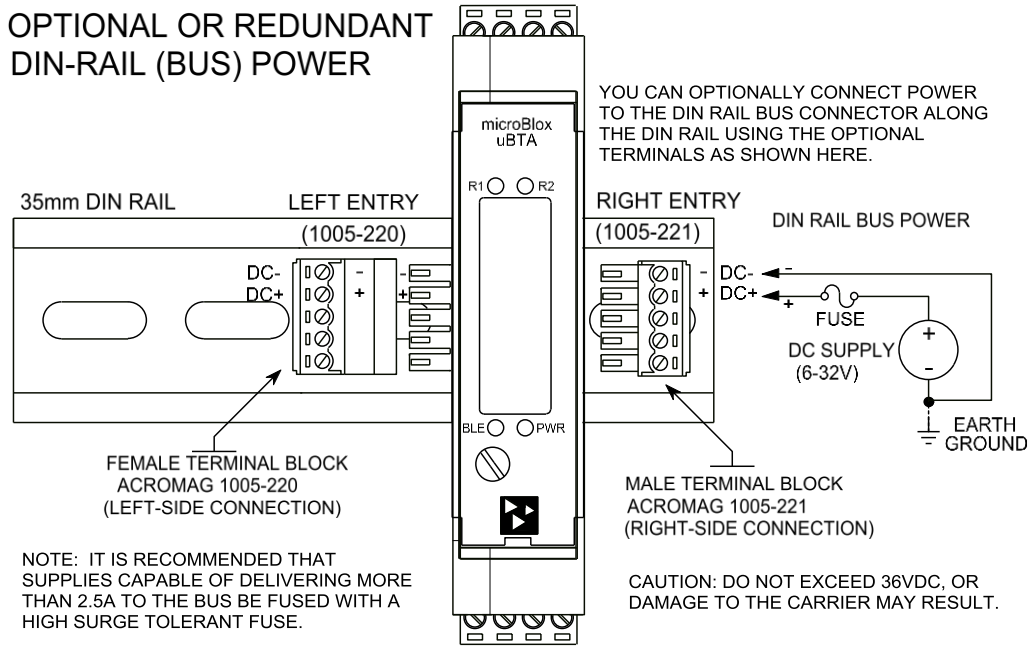
The unit may be optionally powered (or redundantly powered) via its DIN rail connector as shown below (optional terminal is required). The bus power connector of the module can be used to interconnect between modules by plugging them together and then connecting them as a group to a suitable power supply using an optional left or right terminal block, 1005-220 or 1005-221, as shown.

uBTA/uBTX-H MODEL OPTIONAL BUS POWER WIRING



Power Connections…

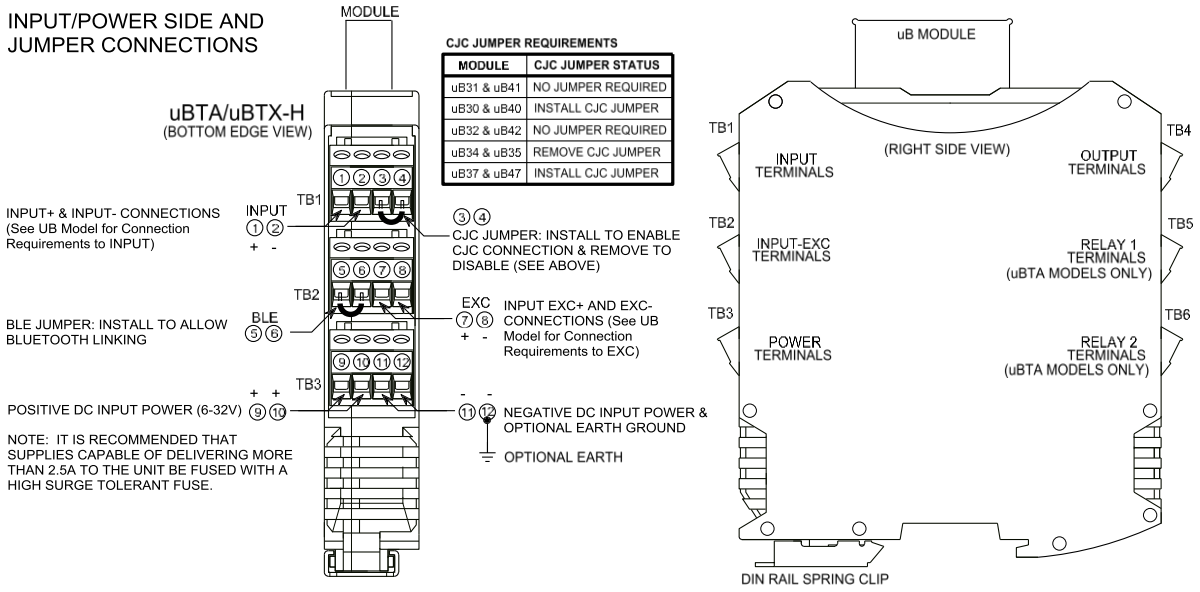
IMPORTANT –End Stops: If this module uses optional bus power, or is redundantly powered via the DIN rail bus, then for hazardous location installations (Class I, Division 2 or ATEX Zone 2) it must also use two end stops to help secure the terminal block and module assembly to the DIN rail (Acromag part 1027-222 not shown but included in XTBUS-KIT).



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

Input Connections, BLE Jumper, and CJC Jumper

A single MicroBlox input module plugs directly into the front panel opening of this carrier and is retained by an internal spring clip. Input connections are wired to the carrier terminals in the same fashion as input connections to uB modules when mounted on uB back-panels (refer to your uB manual per specific model). Wired jumpers are also used on this carrier to enable BLE linking and CJC connections, and have the same effect as setting the standard uB backpanel BLE and CJC switches (a jumper present equals switch ON).



Observe proper polarity when making input connections. TB1 of this carrier connects INPUT ±, while TB2 connects EXC ±. The last two terminals of TB1 are for installation of a CJC jump-wire to enable CJC for some input models (see table above) and this has the equivalent function of the CJC DIP switch of uB back-panels. Similarly, TB2 includes two jumper terminals to enable Bluetooth wireless technology linking (refer to your uB model instructions) and adding this jumper is equivalent to switching the BLE DIP switch of uB back-panels ON. Refer to the table above and add or remove this jump-wire between the last two terminals of TB1—some modules will require a CJC connection, while others do not. Installing a jump wire between the first two terminals of TB2 will enable you to link to the installed uB module using Bluetooth wireless technology from your smartphone or tablet (remove this jumper to block access). Refer to the figure above and your specific uB module manual (see below) for info on making input connections, or for information about CJC jumper installation, or enabling Bluetooth wireless technology linking:

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

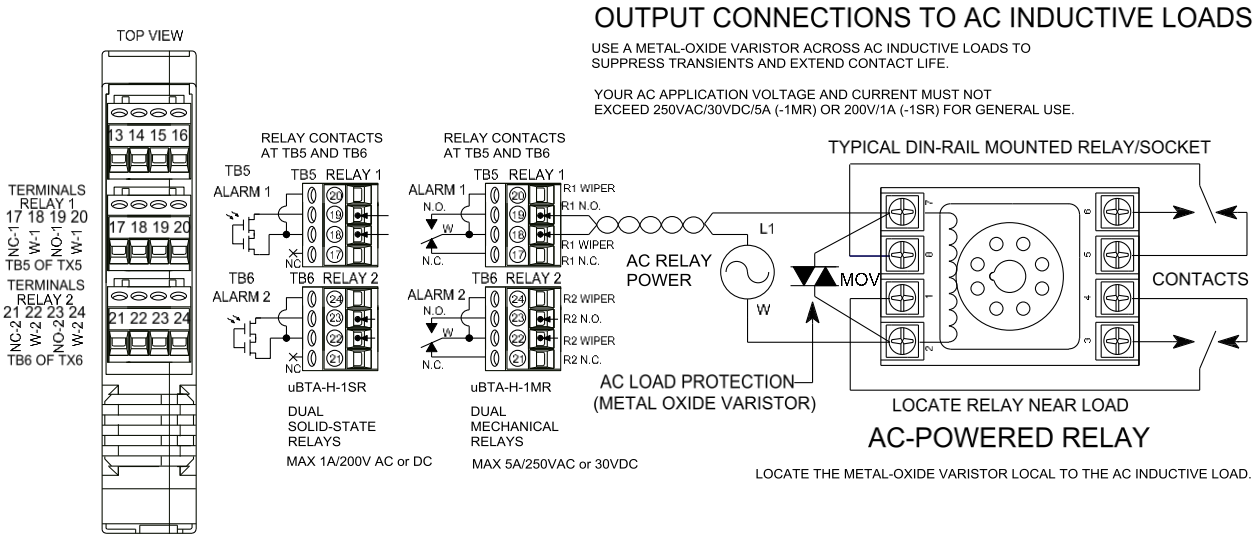
Earth Ground Connections

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. Power connections usually apply earth ground at DC- to the unit. Output connections apply earth ground to the transmitter output common terminal. Circuits wired to analog inputs should be earth grounded as reflected in their connection diagram for the specific module model. Ground connections noted are recommended for best results and help protect the unit and its isolated circuitry by giving it a low impedance path to ground for shunting potentially destructive transient energy away from sensitive module circuitry. Refer to the Electrical Connection Drawings for recommended input, transmitter output, and power ground connections.

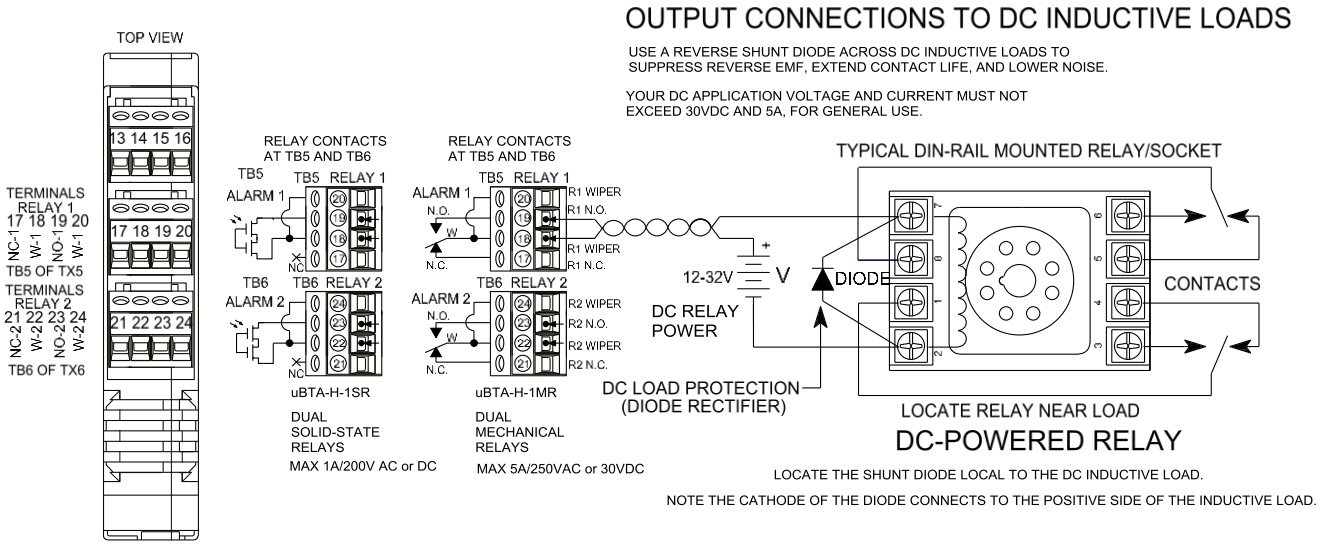
Interposing Relay Connections

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

INTERPOSING RELAY CONNECTIONS FOR INCREASING RELAY DRIVE CAPABILITY



Interposing Relay Connections



IMPORTANT: Because the solid-state relay of the uBTA-H-1SR model is both AC and DC rated, it is not possible to also include contact protection built-into the relay output of this device (a diode is normally used for DC, and a MOV for AC). The required protection is always best placed at the load as shown above. You should always include this protection in your installation when switching inductive loads, or damage to the relay could occur.

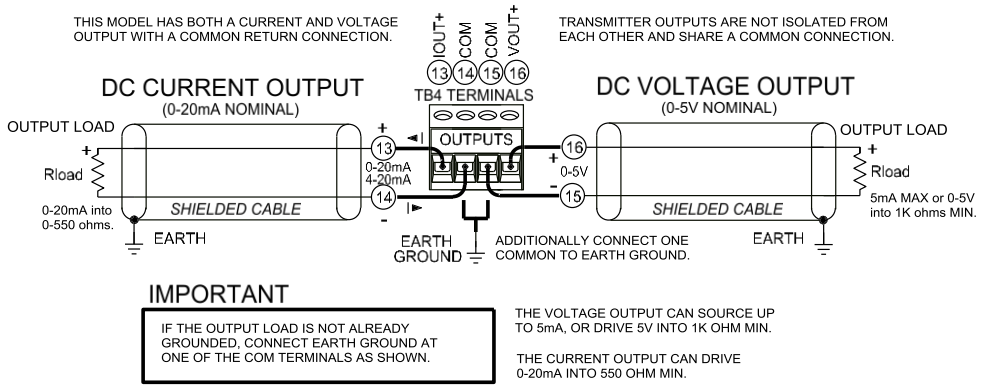
Add Contact Protection When Switching Inductive Loads

If any of 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 figures above (these carriers do not already include this protection which is different for AC and DC loads). 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 carrier 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.

Transmitter Output Connections

This carrier includes both 0-20mA current (550Ω max), and 0-5V voltage (1KΩ min) transmitter output connections at TB4 as shown below. Output voltage is driven directly by the plug-in module, while the carrier includes a voltage to current converter to also output 0-20mA DC for 0-5V driven by the module. The simultaneous current and voltage outputs are not isolated from each other and share common. This output circuit is normally earth grounded at the output common terminal as shown below.

MODEL uBTA/uBTX-H TRANSMITTER OUTPUT CONNECTIONS

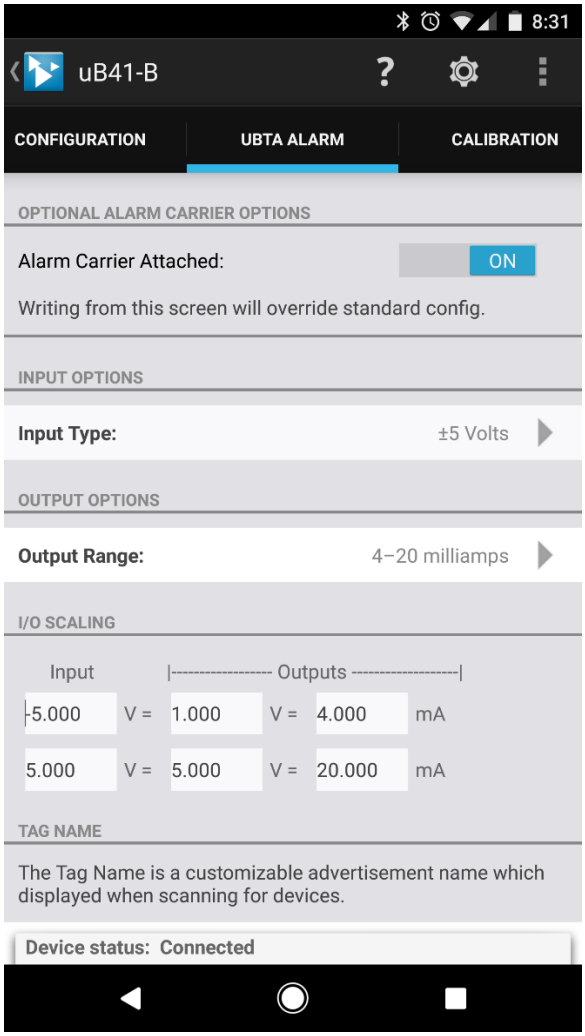


Note – For 4-20mA Transmitter Output: The alarm carrier normally requires that the input module scales its input range to 0-5V for use on this carrier, and this will drive 0-20mA at the carrier's current output. If your application requires a 4-20mA current output, you may use the I/O Scaling function 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.

CONFIGURATION SOFTWARE

The alarm functionality of this carrier is setup inside the Bluetooth wireless technology uB module plugged into it. 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.

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

Optional Output Current Trim Adjustment

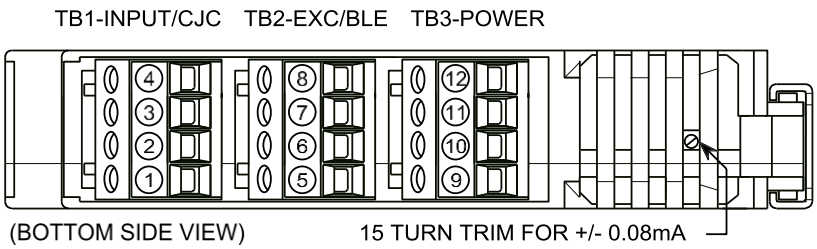
IMPORTANT: This adjustment has already been done at the factory using precision instruments and should not be attempted in the field unless fine accuracy can be assured (precision load, DVM, input source, etc.). Otherwise, you could make the current output less accurate.

This carrier includes both analog voltage (0-5V) and current output (0-20mA). The voltage output is driven by the plug-in module directly, while the carrier includes a voltage to current converter on-board to drive 0-20mA from the 0-5V provided by the module. Normally, the current output will not require a trim adjustment, except perhaps to precisely set its output to tighter accuracy or to correct for long-term component aging. A 15-turn mechanical trim pot is included in this circuit to fine tune the full-scale 20mA output with 5V full-scale from the module. It provides roughly ±0.08mA of adjustment around 20mA and is accessible with a screw-driver inserted through one of the vent openings on the bottom/input side of the module as shown in the drawing below. If your full-scale current output is not within ±0.1% of 20mA, you may utilize this trim pot to make fine adjustment to its current output at full-scale (with 5V full-scale from module).

CAUTION: You must be very careful when inserting a screwdriver into this vent to adjust the trim pot. Most screwdrivers are conductive and it would be very easy to inadvertently short circuit the enclosed circuit if the screwdriver blade did not align with the trim pot screw and was inadvertently pushed too far into the circuit enclosure. This could damage the live circuit and may be unsafe if isolation is inadvertently violated.

Refer to the following figure 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 with greater accuracy than ±0.1%, and measure output current as a function of the voltage drop across this load resistor. A 250Ω precision resistor will indicate 5V across it with precisely 20mA through it.

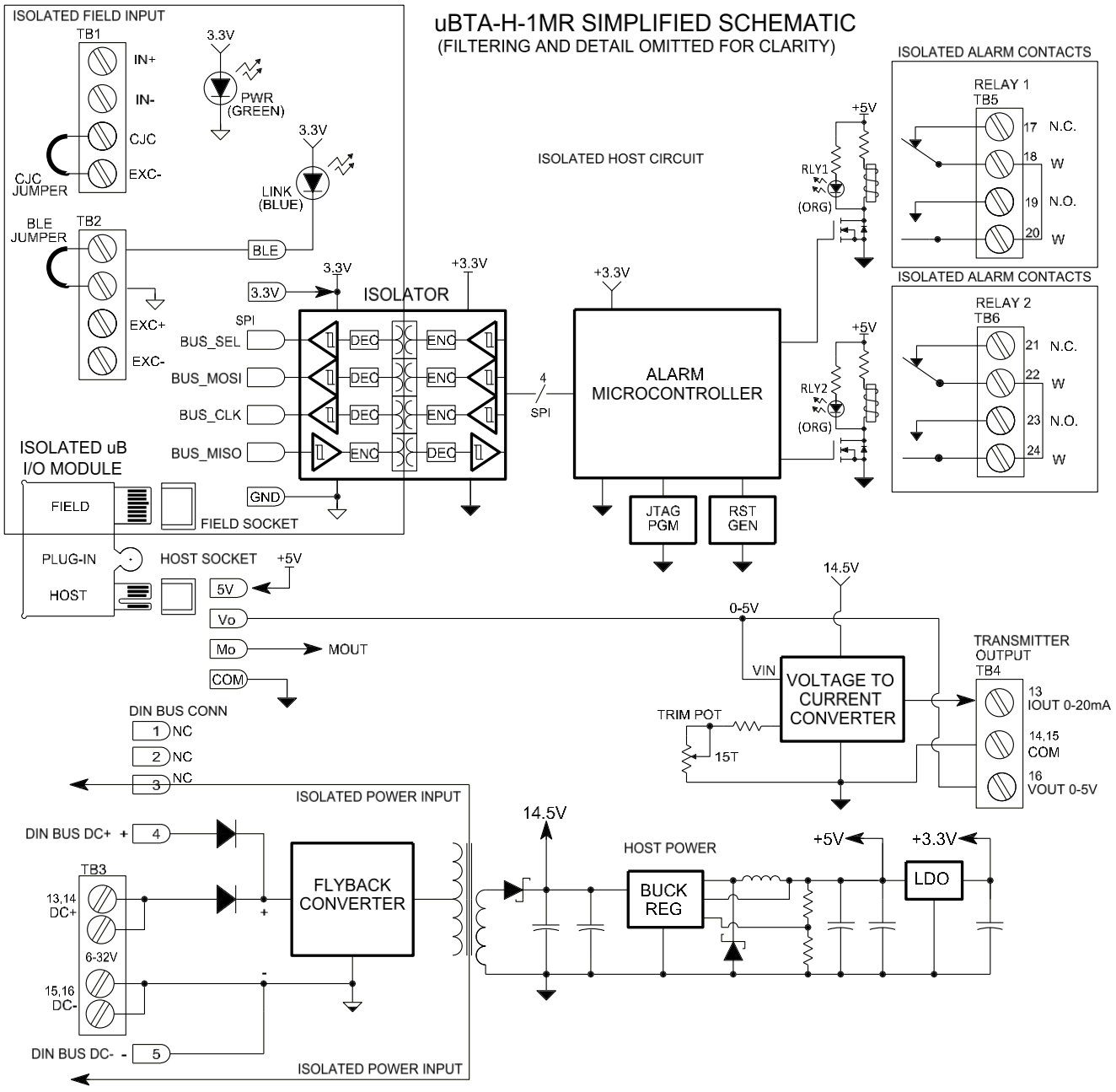
uBTA/uBTX-H CURRENT OUTPUT TRIM POT LOCATION



Note that you can optionally make this adjustment without plugging a module into a powered carrier by simply connecting a precision 5V signal to the voltage output terminals to mimic a module present (with no module plugged in, observe proper polarity), then adjusting the current output to precisely 20mA by adjusting this pot as required. With a precision 250Ω load across the current output terminals, you would adjust this pot until you read precisely 5V±5mV on a DVM placed across the load resistor. Of course, doing it this way would not additionally compensate for any potential module offset of up to ±0.05% or ±2.5mV between different calibrated modules in the same carrier socket.

TECHNICAL REFERENCE

Block Diagram



How It Works

Key Points of Operation

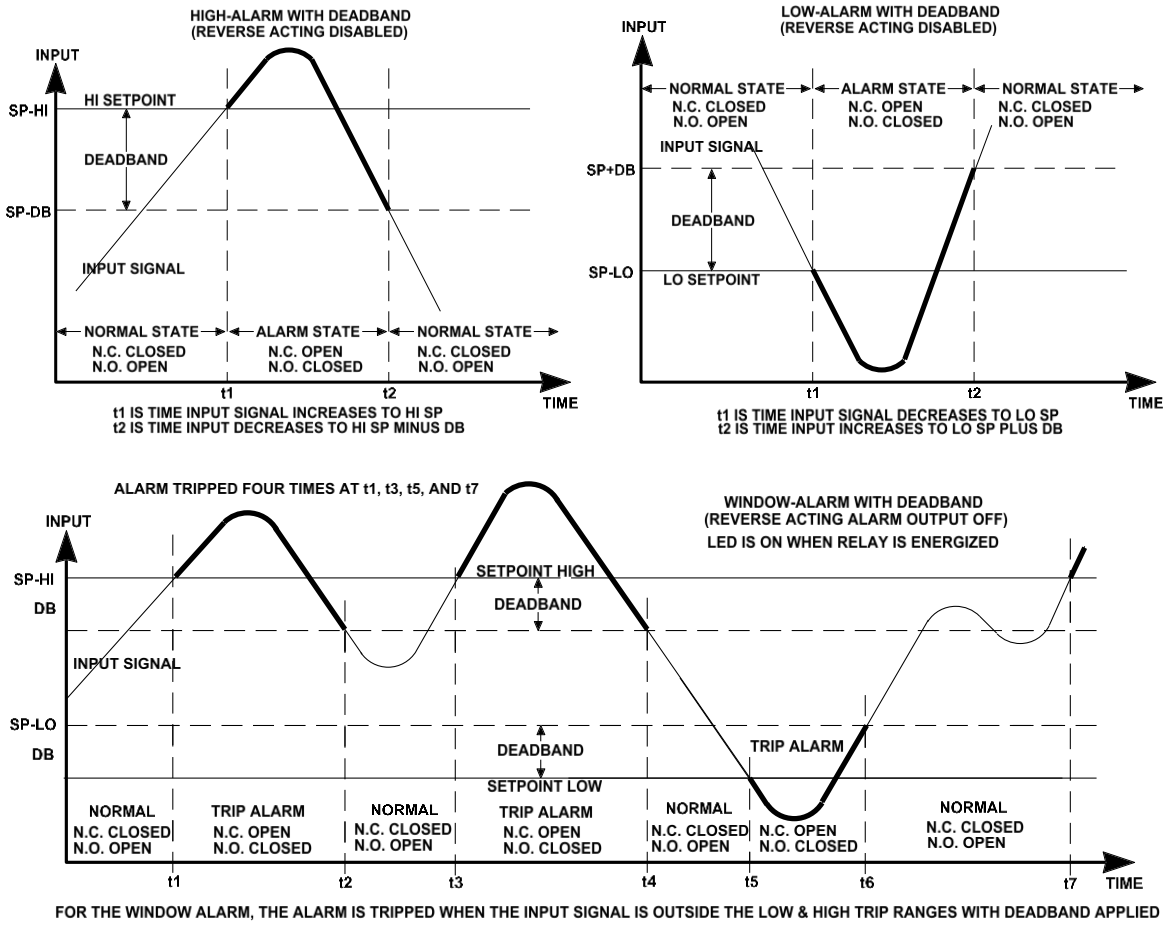
- Input Module plugs in and are available for current, voltage, RTD, and temperature input.
- Carriers include dual mechanical or solid-state alarm contacts.
- Carriers also drive voltage and current transmitter outputs.
- All I/O uses 16-bit A/D and D/A conversion.
- Isolated 6-32V DC Powered.
- Input, Output, Power, and each Relay are isolated from each other.

A microBlox® input module is captively-plugged into this carrier through its front panel. The carrier drives isolated 5V power to the module from an isolated flyback converter that operates from 6-32V. It receives a 0-5V output signal from the plugged-in module, isolated from and proportional to the module's field input signal. A local microcontroller on the carrier handles alarm management. It retrieves alarm configuration information from the module via a 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 output current (0-20mA/550Ω). The carrier includes dual FORM C (SPDT) mechanical relay contacts, or dual FORM A (SPST) solid-state relay contacts depending on model. A 15-turn mechanical pot on the carrier allows optional fine adjustment of its 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

uBTA-H-1x Models Only

With two relays, this product supports two High or Low limits, or two window alarms. 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 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 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
Green RUN LED of Carrier does not light…	
Is Power ON at the Carrier? Is a module plugged into the carrier?	Check power to the carrier. The Green PWR LED will be ON if a module is plugged in and unit is powered?
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. 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.
Blue BLE LED of Carrier does not light…	
Cannot Communicate with Module Using Bluetooth wireless technology…	
Is the BLE jump wire installed at TB2? Is the BLE jump-wire connected between the wrong TB2 terminals?	Check your TB2 connections. A wire jumper should be inserted between the first two terminals of TB2, which turns the BLE LED ON and allows you to link to the plug-in module using the Agility mobile app to accomplish alarm reconfiguration.
Unit Fails to Start-up or Initialize…	
Carrier input power voltage is below 6V, or the input supply is current-limited below twice the module/carrier current draw and has shut down.	Check your power voltage and capacity and make sure that it is at least 6V and of sufficient current capacity (refer to Power and make sure the supply current capacity is twice the max current draw of your application).
Input Polarity is Wrong…	
Are your input terminals reversed? The unit has reverse polarity protection to 60V.	Check your input (field) wiring and observe proper polarity. Voltage is positive and current is input at the IN+ terminal, while voltage is negative and current is returned at the IN- terminal.
Your uB Module Does Not Appear to Work in This Carrier	
Is your module a Model uB45-B?	The uB45-B frequency model is not compatible with this carrier for alarms, but permissible for transmitter functionality.
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 output may be used to convert their output voltage to output current on this carrier.

TROUBLESHOOTING

Diagnostics Table

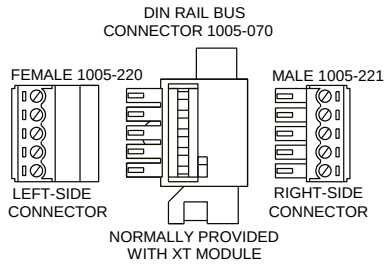
POSSIBLE CAUSE	POSSIBLE FIX
Alarm Contacts are "Chattering" or Alarm LED is blinking...	
Have you applied dead-band correctly?	Increase the alarm dead-band setting (Refer to Alarm Operation on Page 16 to see how dead-band can combat chatter).
Output Signal Appears Noisy or Unstable...	
Is the uB module 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 acceptable for transmitter functionality.
Have you grounded your input signal? Ungrounded inputs require an earth connection as noted in the module specifications.	Earth ground keeps isolated signals from floating and provides a safe path to shunt away 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 of an input, see module wiring).
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 Jumper	Refer to your module specifications and determine the required CJC jumper status. Install or remove this jumper as required.
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.	The current output load resistance is greater than 550Ω. If load resistance is equal to or less than 550Ω, then the carrier's 14.5V internal rail may have failed 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 enclosure is not meant to be opened for access and can be easily damaged if snapped apart. Thus, it is highly 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.

ACCESSORIES

DIN Rail Bus Connector Kit



Model XTBUS-KIT Bus Connector Kit for DIN Rail Bus Connection to Power, compatible with enclosures of Acromag Series XT and uBTA-H product models.

This kit contains one each of the following terminals

- DIN Rail Bus Connector 1005-070 for 22.5mm Enclosures.
- Left Side terminal block, female connector 1005-220.
- Right Side terminal block, male connector 1005-221.
- Two End Stops for 35 mm DIN Rails 1027-222 (not shown).

The module is shipped with the first item included in this kit, DIN Rail Bus Connector 1005-070--this kit offers a spare. Left and right side terminal blocks that mate directly to the bus connector are also included in this kit. These terminals are used to optionally (or redundantly) drive power to the carrier via its DIN rail bus connector. This allows modules to neatly and conveniently share connections to Power by plugging enclosures together. Two DIN rail end stops 1027-222, are used to secure the terminal block and module(s) to the DIN rail for hazardous location installations.

NOTE: The maximum number of modules that can be plugged-together and powered from a bus connection will be limited by twice its combined current draw at a given supply voltage below 3A of maximum allowable current. This allows you to safely fuse the DIN rail bus power connection with a surge-tolerant fuse no greater than 2.5A (recommended). Note that current draw is normally reduced at higher input voltages and current to the unit(s) should never be allowed to exceed 3A even for bussed powered units. Sustained current at 3A or above may damage the power circuit, and this could occur for an over-loaded bus or a sustained over-voltage condition that could drive an inadvertent short-circuit for a clamped transient voltage suppressor across the input power terminals of a unit.

End Stops

Two End Stops – Order 4001-252

- Two 1027-222 End Stops for 35 mm DIN Rail mounting

For hazardous location installations (Class I, Division 2 or ATEX / IECEx Zone 2), you can use two end stops (Acromag 1027-222) to help secure modules to 35mm DIN rail (not shown).

SPECIFICATIONS

Model Number

uBTA-H-1MR: Single Trx/Alm in Housing w/Mechanical Relays.

uBTA-H-1SR: Single Trx/Alm in Housing w/Solid-State Relays.

uBTXA-H-1: Single Transmitter in Housing, no relays.

These products are DIN-Rail mounted, microBlox® module carriers that provide optional alarm and transmitter functionality to Bluetooth wireless technology-enabled modules of the microBlox® I/O family.

The model "uB" prefix denotes these as members of the Acromag microBlox® family, while "TA" denotes Transmitter/Alarm ("TX" is Transmitter only model), the "-H" suffix denotes with Housing (enclosure), the trailing "-1" suffix denotes a single microBlox® channel, while "MR" denotes Mechanical Relay Outputs ("SR" denotes solid-state relay outputs). All versions of this carrier are DC powered and include CE & UL/cUL Class I, Division 2 Approvals.

Carriers are normally mounted on standard 35mm "T" Type DIN rail and include plug-in terminals. Carrier power can be optionally (or redundantly) bussed along the DIN rail (see Power Connections).

The configuration of alarm functionality on this carrier will require an Android or iOS Bluetooth wireless technology connection to your smartphone or tablet and our free Agility Wireless App (linking to module must be enabled on this carrier).

Analog (Field) Input

The input to this carrier is to the microBlox input module model plugged into it. Input wiring is applied to TB1 and TB2 of the carrier. Refer to your module's instructions for detailed input and connection specifications.

Accuracy: Better than ±0.05% of span typical relative to the module and an additional ±0.05% of span relative to this carrier, for a net accuracy of ±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 to the microBlox® input module plugged into this carrier. Refer to your module instructions for detailed field connections. The following uB input models are compatible with this carrier (the uB45-B frequency model is not compatible with this carrier for alarm functions, but permissible for transmitter functionality):

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

Model	Nominal Module Inputs	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	

The uB module must be configured for its 0-5V output range when used on this carrier and any input subrange must be scaled to 0-5V output. For alarm functionality, only Bluetooth wireless technology enabled modules can be used, as wireless reconfiguration is required. For transmitter-only functionality, any uB module with a 0-5V/1-5V output signal may be used (52 possible variations).

The module field input, carrier power, and transmitter outputs must be wired and configured for its I/O type and range for use on this carrier (see Connections section for details).

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

Alarm Relay Outputs

Relay Terminals are located at TB5 (Relay 1) and TB6 (Relay 2).

Mechanical Relay Model (-1MR Suffix Model)

This model contains two independent electromechanical relays. 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.

Type: Dual 1 FORM C (Two SPDT, Normally Open & Normally Closed contacts).
Ratings: 5A, 250VAC/30VDC, no deration required over temperature.
Minimum Switching Load: 100mA, 5VDC.
Electrical Life: $50x10^3$ operations minimum, N.O. contact; $30x10^3$ operations minimum, N.C. contact at 5A, 250VAC/30VDC resistive.
Mechanical Life: $10x10^6$ operations minimum.
Contact Material: Silver-tin oxide (AgSnO2).
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.

Solid-State Relay Model (-1SR Suffix Model)

This model contains two independent solid-state relay contacts. 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.

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.

Both uBTA-H-1x Models

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

The transmitter current and voltage output connections are located at TB4.

All Models

This carrier 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.

Transmitter Outputs

Voltage Output
Re-transmitted from module.

Voltage Range: 0-5V, equivalent to the microBlox® module output retransmitted at the carrier output ±voltage terminals TB4.
Voltage Load: 5V into 1KΩ minimum, or 5mA Maximum.
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.

Current Output
Derived from plug-in module and transmitted from carrier.

Current Range: 0-20mA/0-5V, 4-20mA/1-5V, output current and current return at TB4.
Note for 4-20mA Current Output: The alarm carrier normally requires that input modules scale their input to 0-5V output for use on this carrier, which also produces 0-20mA at the carrier's current output. If your application requires a 4-20mA current 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 output instead of 0-5V, to produce 4-20mA from the alarm carrier (note the tandem voltage output of the carrier also becomes 1-5V, not 0-5V). The App will also scale for you if you select 4-20mA as an output type option under the uBTA Alarm tab (which also sets the voltage output to 1-5V).
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 a precision 15 turn Trim Pot near the output terminals. 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).

Controls

The LED indicators are located on the front-panel adjacent to the module socket. The CJC and BLE jumpers are wired between TB1 and TB2 terminals.

LED Indicators (front-panel)

PWR (Green) - ON indicates power is applied to carrier and the uB module is operating normally (sourced by 3.3V from module).
BLE (Blue) – ON indicates Linking to module is enabled (requires BLE jumper, sourced by 3.3V from module).
Relay 1 & Relay 2 (Orange) - ON indicates corresponding relay is energized.

BLE Jumper *(Install at TB2)*
Install a jumper between the first two terminals of TB2 to allow a Bluetooth wireless technology link to the module to accomplish alarm reconfiguration.

CJC Jumper *(Install at TB1)*
Install a jumper between the last two terminals of TB1 to make a CJC connection. Some modules require this jumper to be installed or removed depending on the model per below (also consult specific module instructions).

CJC JUMPER	uB30/40	uB31/41	uB32/42	uB34/35	uB37/47
IN or OUT		√	√		
INSTALL	√				√
REMOVE				√	

Alarm Configuration

Alarm functionality of alarm carriers (uBTA-H-1x) can only be configured via a Bluetooth wireless technology connection from an Android or iOS smartphone or tablet and the Acromag Agility mobile app to your specific uB model.

Alarm Operating Types

Dual Limit: Limit alarms have a high/low set-point applied to the input and assigned to a 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 at an input and assigned to a relay, such that 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 past the defined set-point, plus its dead-band.

Alarm Set-point

A high or low level (plus dead-band) may be assigned to each relay and is programmable over the entire input range of the 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

A region associated with each set-point level that is 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 small fluctuations in the input near the set-point levels.

IMPORTANT: Noise and/or jitter on the input signal has the effect of reducing (narrowing) the dead-band region and may produce contact chatter—you may increase dead-band to squelch this chatter. This is very important for mechanical relays because a negative effect of continued contact chatter is reduced mechanical relay contact life.

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

For "Failsafe" operation, the relay is de-energized in the alarm state (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 a non-failsafe alarm uses 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-H-1MR model has both normally open and normally closed contacts).

Power

Connect power at TB3-1/2 (+) and TB3-3/4 (-), and/or via the DIN Rail Bus AT TB7.

The unit can be redundantly powered by connecting power to both the power terminals on the unit at TB3 and at the DIN rail bus terminal TB7 (these power inputs are diode-coupled to the same point in the circuit).

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 1.7W including plug-in module. Your current draw is dependent on your carrier model, its relay type, whether you use the transmitter outputs, your plug-in module, and your voltage level. You can approximate power consumption by combining power items you are using and this summation applies quite well for supply voltages from 9-32V.

POWER ITEM	AVG REQUIRED POWER AT SUPPLY
uBTX-H Base	0.080W
uBTA-H Base	0.108W
Dual Mechanical Relays	0.355W
Dual Solid-State Relays	0.109W
5mA Voltage Output	0.066W
20mA Current Output	0.348W
uB41 Input Module	0.266W
uB42 Input Module	0.659W

CARRIER	POWER REQUIRED BY ITEM				BY MODULE		AVG
MODEL	BASE	RELAY	V-OUT	I-OUT	uB41	uB42	Ptot
uBTA-H-1MR	0.108	0.355	0.066	0.348	~~0.266~~	**0.659**	**1.54**
uBTA-H-1MR	0.108	0.355	0.066	0.348	**0.266**	~~0.659~~	1.14
uBTA-H-1SR	0.108	0.109	0.066	0.348	~~0.266~~	**0.659**	**1.29**
uBTA-H-1SR	0.108	0.109	0.066	0.348	***0.266***	~~0.659~~	0.90
uBTX-H-1	0.08	0	0.066	0.348	~~0.266~~	**0.659**	**1.15**
uBTX-H-1	0.08	0	0.066	0.348	***0.266***	~~0.659~~	0.76

The rightmost column represents typical average input power with a module installed. A uB41 is used to represent a standard module load, while a uB42 represents the largest module load. For current, divide the Ptot figure for your carrier model and module combination (last column above) by your supply voltage to get your current ±5% for fully loaded conditions (see Tables below). Multiply the Table currents below by 1.1 to get maximum current from 9-32V (multiply it by 1.2 for maximum current at 6V):

w/uB41	uBTA-H-1MR	uBTA-H-1SR	uBTX-H-1
POWER	**1.14W**	**0.90W**	**0.76W**
SUPPLY	**Fully Loaded Current Draw w/uB41**		
6V	191mA	150mA	127mA
9V	127mA	100mA	84mA
12V	95mA	75mA	63mA
15V	76mA	60mA	51mA
24V	48mA	37mA	32mA
32V	36m	29mA	24mA

Power

w/uB42	uBTA-H-1MR	uBTA-H-1SR	uBTX-H-1
POWER SUPPLY	1.54W	1.29W	1.15W
	Fully Loaded Current Draw w/uB42		
6V	257mA	215mA	192mA
9V	171mA	143mA	128mA
12V	128mA	108mA	96mA
15V	102mA	86mA	77mA
24V	64mA	54mA	48mA
32V	48m	40mA	36mA

Power Supply Effect: Less than ±0.001% of output span effect per volt DC change.

Enclosure & Physical

General purpose plastic enclosure with an integrated DIN clip for mounting on 35mm "T-type" DIN rail.

Dimensions: Width = 22.5mm (0.9 inches), Length = 114.5mm (4.51 inches), Depth = 99.0mm (3.90 inches without module plugged in). Refer to Mechanical Dimensions drawing. Note that the plug-in module adds approximately 14mm (0.55") to the vertical depth of the plastic enclosure mounted on a DIN rail.
I/O Connectors: Includes removable plug-in type terminal blocks rated for 12A/250V; AWG #26-14 stranded or solid copper wire.
Case 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. The input, the carrier transmitter outputs (together), carrier power, and the 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: Model uBTA-P-1 carries are 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.

Ⓔx II 3 G Ex nA nC IIC T4 Gc -40°C ≤ Ta ≤ +75°C (For model uBTA-H-1MR only)
Ⓔx II 3 G Ex nA IIC T4 Gc -40°C ≤ Ta ≤ +75°C (For all other models)
DEMKO 18 ATEX 2086**X** IECEx UL 18.0092**X**
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 set to 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_BG_C*

uBTA-H-1x	MTBF (Hours)	MTBF (Years)	Failure Rate (FIT)
25°C	TBD hrs	TBD years	TBD
40°C	TBD hrs	TBD years	TBD
uBTX-H-1	**MTBF (Hours)**	**MTBF (Years)**	**Failure Rate (FIT)**
25°C	TBD hrs	TBD years	TBD
40°C	TBD hrs	TBD years	TBD

REVISION HISTORY

The following table shows the revision history for this document

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