SUPPLEMENTAL INSTRUCTIONS

BrightStat LUA Application Guide and Installation Instructions

LUA Script File: LUA-0001

BrightStat Models:

8403-081 – Temp, Humidity, Motion with CO_2

8403-083 – Temp, Humidity with CO_2

Unit Compatible Models:

I-TEC® IA Units with "T"Ventilation Option

Contents

General Information

BrightStat Overview

Product applications often require specific thermostat settings and at times customized unit operation. The BrightStat is a highly customizable advanced controller that provides flexibility beyond what is capable when using standard thermostats. Features that normally take advanced programming are available by using a simple, yet powerful code called LUA script. LUA script files can be pre-programmed by Bard or user programmed by uploading a file using an uploader tool. The uploader tool can be downloaded at: www.viconics.com/product/46-vt8650-rooftop-unit-heat-pump-and-indoor-air-quality-controller.html

Bard® SINCE 1914
Climate Control Solutions

Bard Manufacturing Company, Inc.
Bryan, Ohio 43506
www.bardhvac.com

Manual: 7960-926
Supersedes: ***NEW***
Date: 11-12-21

LUA Script Overview

LUA script files allow features to be pre-programmed into the BrightStat including set point, user passwords, operational settings, custom messages, special unit operation and much more. This manual will explain the following:

- How to identify factory-installed LUA script files.
- Where to find additional resources regarding the BrightStat.
- BrightStat compatible models and Bard cooling/ heating unit compatibility for the LUA script.
- Applications where the specific LUA script is to be used.
- Functionality of the specific LUA script file.
- A sequence of operation performed by the BrightStat using the LUA script.
- Inputs/outputs of the BrightStat using the LUA script.
- Special Bard equipment wiring (if applicable).
- BrightStat menu settings using the LUA script.
- Testing procedures, troubleshooting and LUA script verification.

Field LUA Script Installation

This manual will not concentrate on field installing the LUA script file. Installing a LUA script requires a LUA script file (.lua extension), a MicroUSB cable, a Windows laptop and instructions regarding the procedure needed to install the LUA file. Training is highly recommended before installing LUA script files.

Factory-Installed LUA Script Files

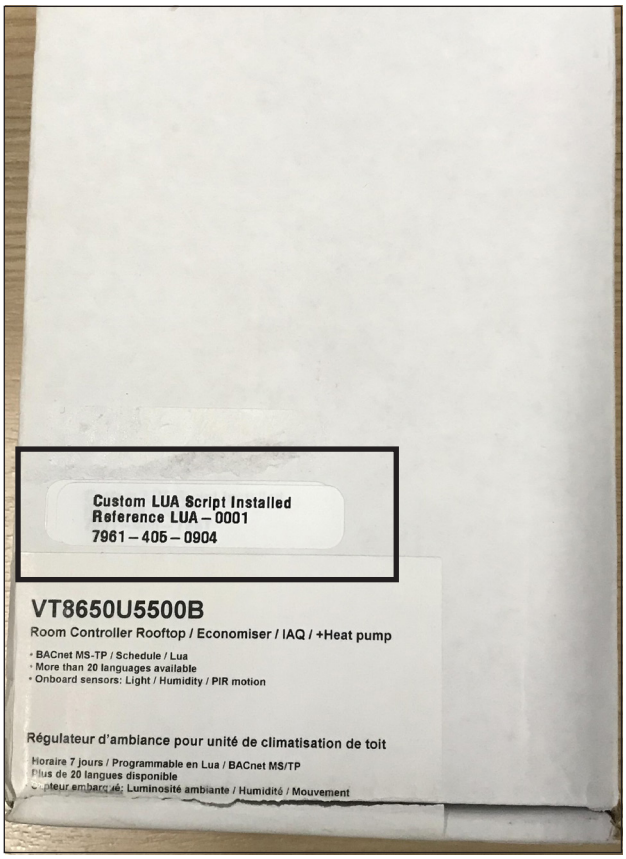
This manual will be focused on features and functionality of the LUA script file, and will cover aspects and processes of the file after it is installed in the BrightStat. Factory-installed LUA scripts will be pre-loaded and user programming is not necessary. User interaction begins by installing the BrightStat and interacting with setup and configuration menus.

Identification of the factory-installed LUA file can be found on the back of the display when removed from the wiring base and on the outside of the shipping packaging (see images below).

Factory-Installed LUA File Identification

Back of Display

Outside of Shipping Packaging



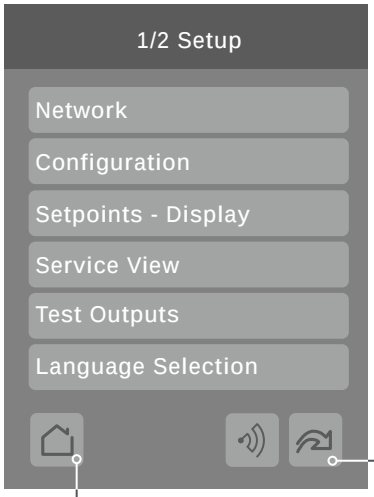
LUA Script Verification in Setup Menu

The LUA script can be viewed on page 2 of the setup menu.

Touch and hold this point for 3 seconds to enter setup mode

NOTE: *If a configuration/installer password is activated to prevent unauthorized access to the configuration menu parameters, a password entry prompt shows to prevent access to device configuration components.*

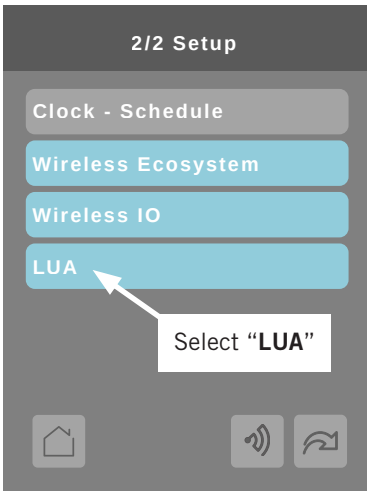
Setup Screen Display 1/2

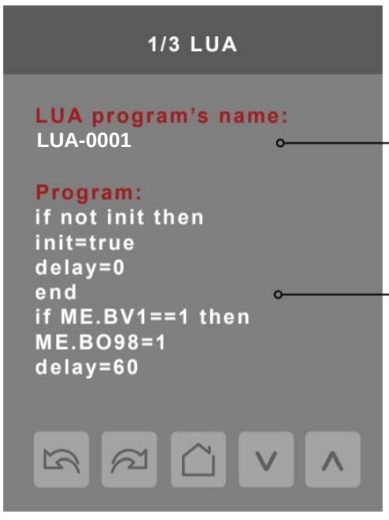


Select **Advance to Next Menu**

Return to Home Screen

Setup Screen Display 2/2





The title of the LUA script is shown here (LUA script file number may vary from example shown)

The body of the LUA script is shown here

Additional BrightStat Resources

The following manuals are available for additional reference regarding the BrightStat:

- 2100-679 – User Interface and Quick Start Guide. This 2-page document covers basic main screen functionality and explain screen symbols.
- 2100-680 – Installation and Application Instructions. This document shows standard controller inputs and outputs along with wall mounting and remote sensor information. Also includes a basic description of how to navigate menus.
- 2100-681 – Advanced Programming Guide. This manual is an in-depth guide of menu options and features provided by the standard BrightStat.
- 2100-683 – BACnet Integration Instructions. This manual provides a guide to BACnet connectivity and available BACnet accessible data.

LUA-0001 Program

LUA-0001 Program Compatibility

The following table shows product compatibility.

BrightStat Models	Unit Models
8403-081 with Motion Sensor and Optional 8403-086 CO_2 Card	I-TEC IA unit models with the "T" ventilation option. The "T" ventilation option will include a mixed air sensor and an outdoor sensor. Relays will be installed in the unit vent option to control wheel and intake/exhaust vent blower operation.
8403-083 without Motion Sensor and Optional 8403-086 CO_2 Card	

NOTE: *Optional CO_2 card must be installed for unit functionality.*

LUA-0001 Program Functionality

I-TEC products are capable of both energy recovery and partial economizer operation with provisions made regarding unit and ventilation wiring. By disabling the ERV wheels and turning on the intake and exhaust blowers, outdoor air can be brought into the indoor area. Logic also needs to be provided that will signal when conditions outside are acceptable for economizer cooling. By using a special ventilation option in the I-TEC, and a special LUA script code in the BrightStat, economizer operation can be accomplished.

- A new "T" ventilation option is released for I-TEC products that allows outdoor air to be brought in without running the ERV wheels. Low voltage terminal "A" is used for ERV ventilation and terminal "1" is used for economizer operation when energized on the low voltage terminal strip. The unit will contain an outdoor sensor, a mixed air sensor located before the evaporator coil and relays to disable the ERV wheels when running in economizer mode.
- LUA-0001 was designed for use with the BrightStat with CO_2 card to control the I-TEC IA unit with the T economizer option. The BrightStat will receive information from the outdoor and mixed air sensors to determine when economizer operation is acceptable. The CO_2 card signals ventilation operation based on occupancy determined by the CO_2 level in the indoor space. CO_2 is measured at the indoor location of the BrightStat.

LUA-0001 Program Sequence of Operation

- – Room is occupied
  – CO_2 levels are within ventilation range
  – Outdoor conditions *are not acceptable* for economizer
  » BrightStat will energize terminal A to provide ERV ventilation no matter whether there is a call for cooling or no call for cooling.
- – Room is occupied
  – CO_2 levels *are not within* ventilation range
  – Outdoor conditions are acceptable for economizer
  – There is a call for cooling
  » BrightStat will energize terminal 1 to provide cooling and ventilation. Terminal A *will not* be energized. The bottom screen banner will say "Economizer Active".
- – Room is occupied
  – CO_2 levels are within ventilation range
  – Outdoor conditions are acceptable for economizer
  – There is a call for cooling
  » BrightStat will energize terminal 1 to provide cooling and ventilation. Terminal A will be energized. The bottom screen banner will say "Economizer Active".
- – Room *is not* occupied
  – CO_2 levels *are not within* ventilation range
  – Outdoor conditions *are not acceptable* for economizer
  – There is a call for cooling
  » BrightStat *will not* use ERV ventilation or economizer operation. The unit will cool and dehumidify using normal compressor operation.

See also **Sequence of Operation Matrix** on page 5.

Economizer Cooling Staging

Economizer operation is energized when the room temperature is 1°F above set point. If the temperature reaches 2°F above set point, the I-TEC unit will use mechanical cooling.

Sequence of Operation Matrix

	None	ERV	Economizer
Cooling Call	No	N/A	Yes
CO_2	Low	High	N/A
Outdoor Air Acceptable	N/A	No	Yes

NOTES

1. The ERV and economizer will both be disabled when there is no call for cooling and the CO_2 levels in the space are low.
2. The ERV will operate when the space has high levels of CO_2 and the outdoor air is not acceptable for economizer operation.
3. The economizer will operate when there is a call for cooling and the outdoor air is acceptable for economizer operation.

BrightStat Terminal Designations Using LUA-0001 Script File

The following table shows the complete BrightStat terminal list (bold indicates use by LUA script file).

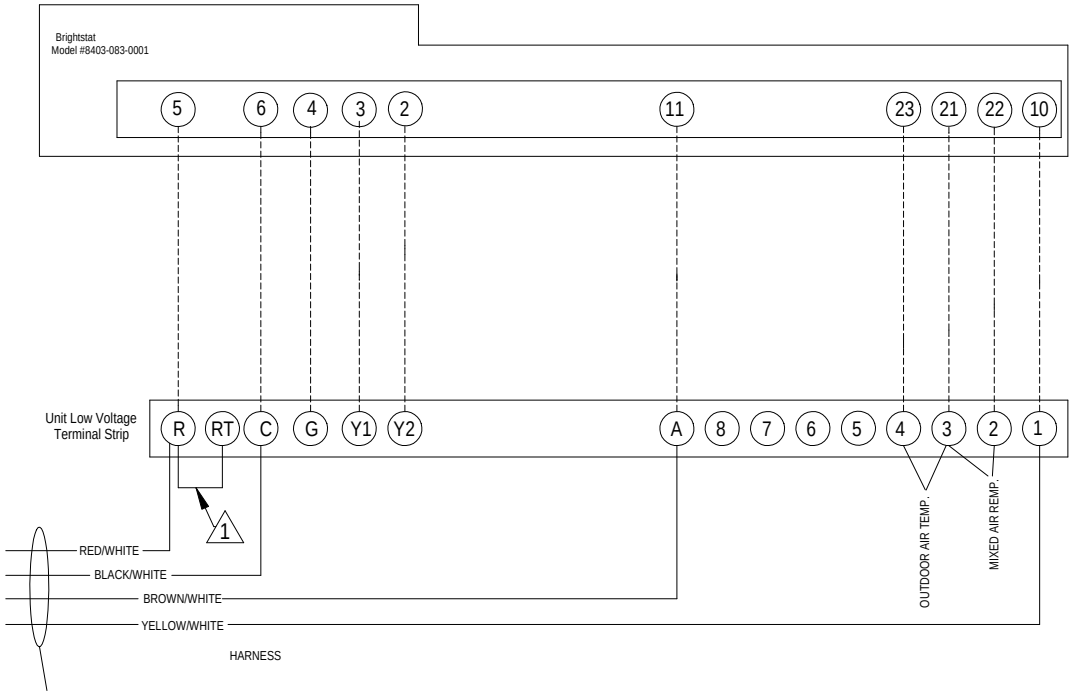
Terminal	Designation	Function
1	BO1	Scheduled occupancy output
2	BO2	Y2
3	BO3	Y1
4	BO4	G
5	RC	24VAC input for cooling
6	C	Common
7	RH	24VAC input for heating
8	B08	W1 – first stage heating output
9	UO9	W2/OB – second stage heating or reversing valve output
10	**UO10**	**Economizer binary output – connects to IA unit terminal 1**
11	**UO11**	**Ventilation based on CO_2 binary output – connects to IA unit terminal A**
12	UO12	Dehumidification output
13	RS485+	BACnet/Modbus
14	RS485-	BACnet/Modbus
15	RS485+ Ref	BACnet/Modbus
16	UI16	Multifunction
17	UI17	Multifunction
18	S com	Common
19	UI19	External CO_2 sensor input
20	UI20	Remote sensor input, 10k type 2
21	**S com**	**Common**
22	**UI22**	**Supply/mixed air sensor input, 10k type 2 – installed before evaporator coil**
23	**UI23**	**Outdoor sensor input, 10k type 2 – installed in outdoor area**
24	UI24	Airflow sensor input, 0-10VDC

NOTE: *Due to the use of the LUA script file, terminal designations are different than what is shown in the standard BrightStat installation and application instructions. Failure to use the LUA script file will result in different terminal inputs and outputs.*

BrightStat Wiring Diagrams

The following wiring diagram illustrates using a BrightStat LUA-0001 script file with the I-TEC “T” ventilation option:

THERMOSTAT CONNECTIONS FOR BARD PART # 8403-083-0001 BRIGHTSTAT TO OPERATE 920-0539 ERV/ECONOMIZER WITH BARD ITEC AIR CONDITIONER



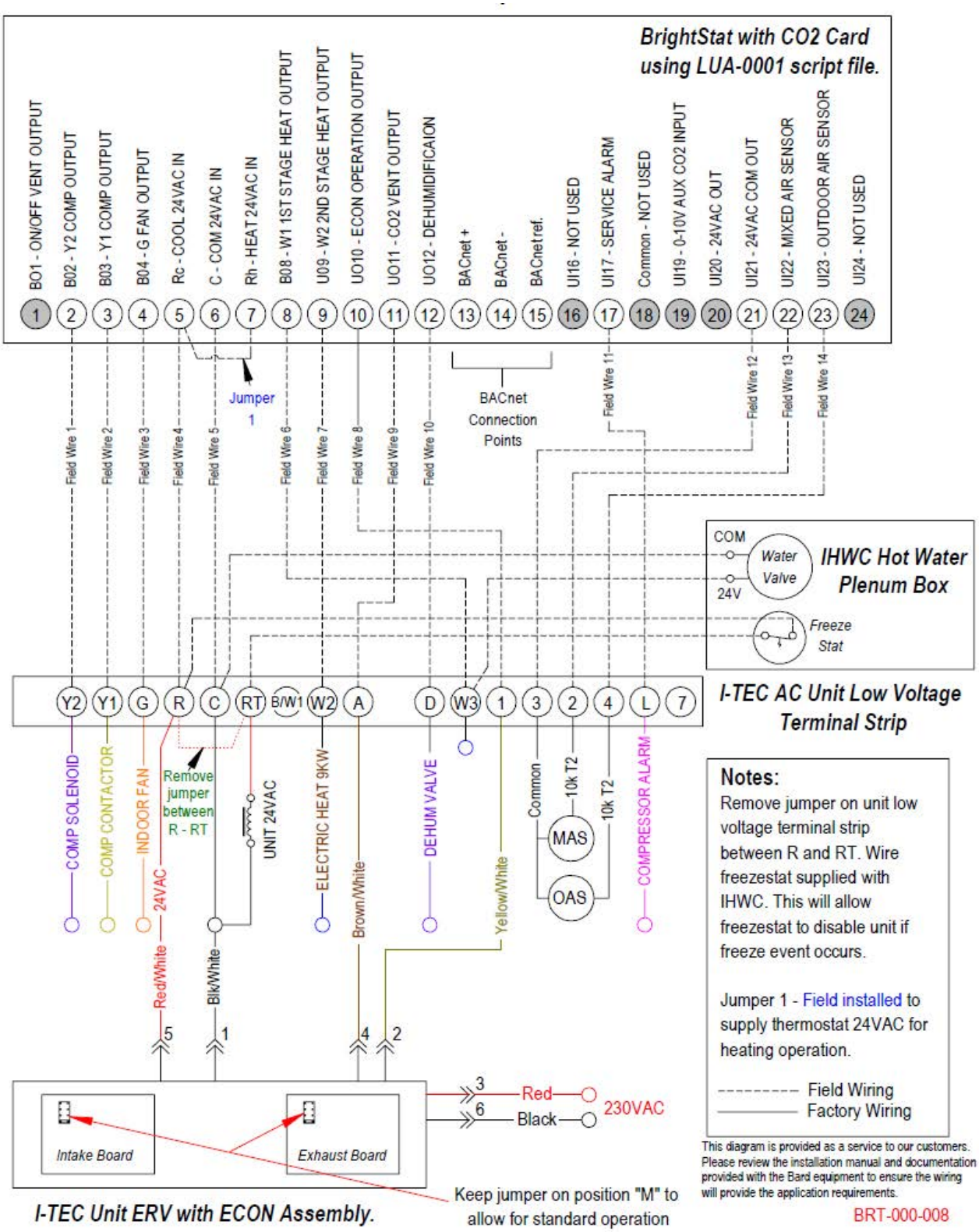
1 Factory installed jumper. Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.

MIS-4349

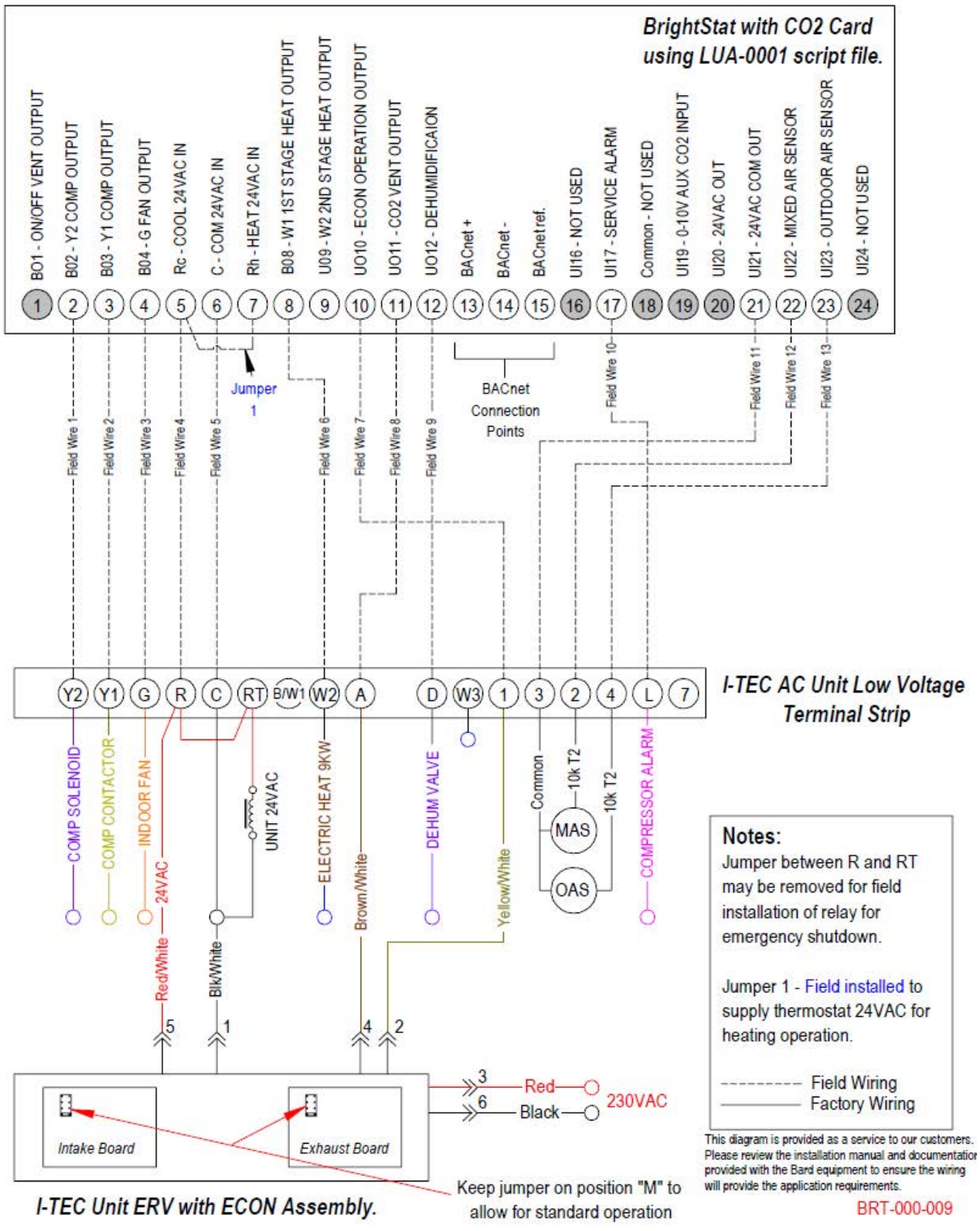
The following diagrams illustrate customer use of the LUA-0001 script file in the field:

NOTE: *This configuration will use electric heat for emergency heat only – requires additional LUA script file.*

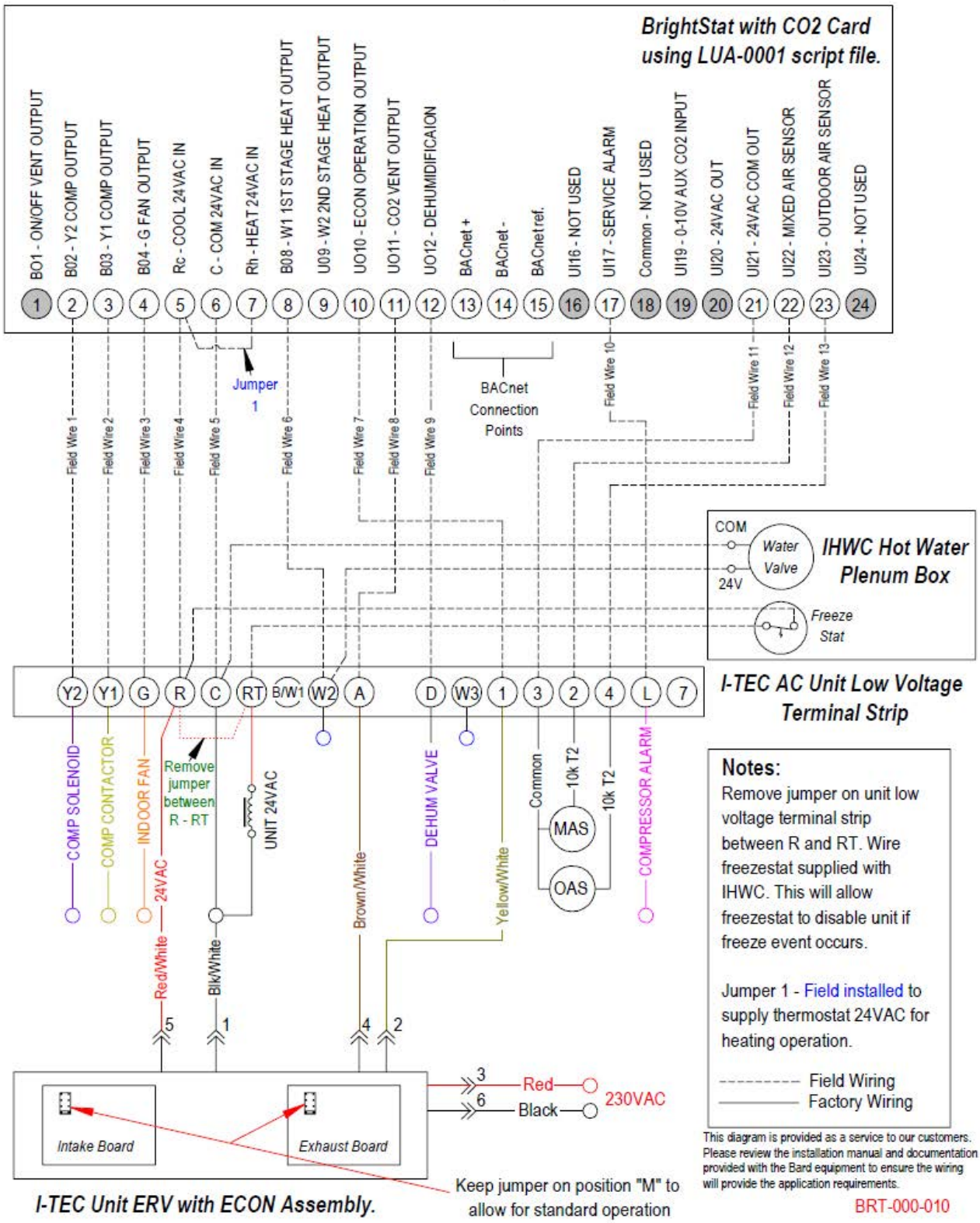
IA Unit, BrightStat, IHWC Hot Water Plenum with 9kw Electric Heat, ERV with Economizer Operation



IA Unit, BrightStat, 9kw Electric Heat, ERV with Economizer Operation



IA Unit, BrightStat, IHWC Hot Water Plenum with 0kw Electric Heat, ERV with Economizer Operation

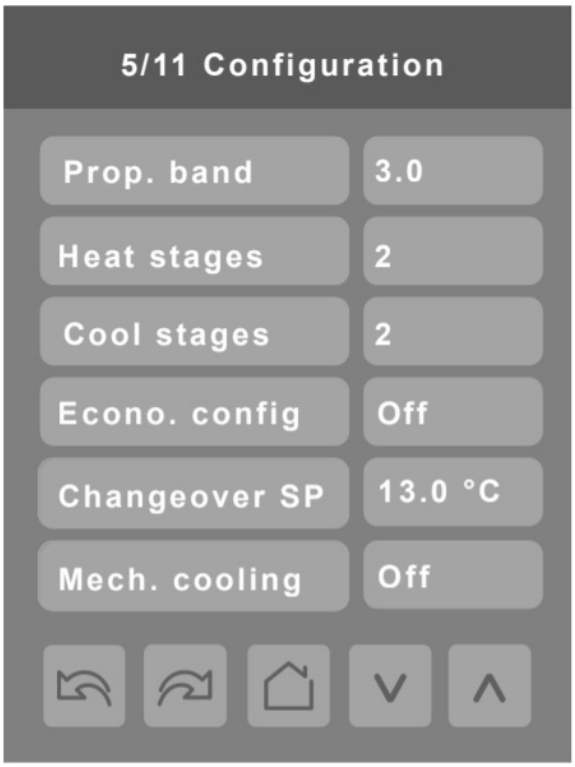


BrightStat Menu Settings

The following describes setup menu items specific to the LUA script file. See page 3 for instructions on entering setup menu.

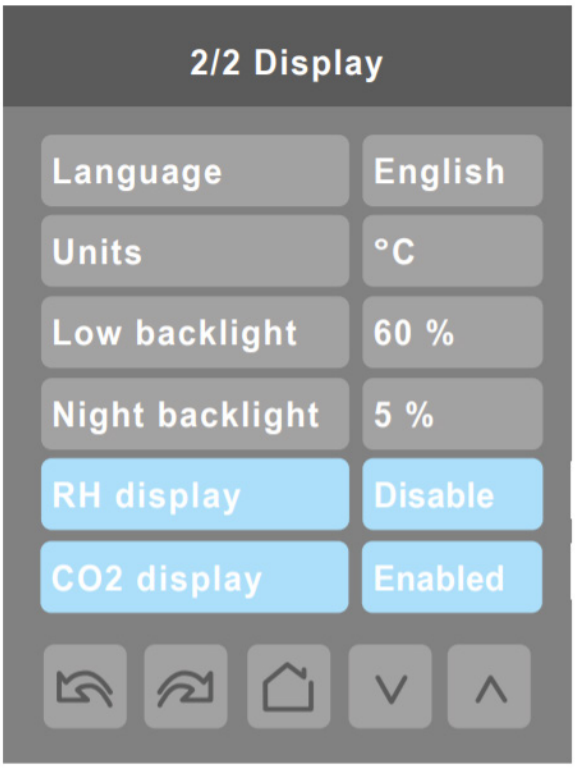
Fan mode setting; set to “smart”.

Economizer operation is adjustable on this screen. Set **Econo. config** to **On**.



CO_2 levels are adjustable on this screen. Set **Max CO2** amount to turn on ventilation. Set **Min CO2** to shut off ventilation.

CO2 display and **RH display** can be enabled on this screen. When enabled, CO_2 and RH values will be displayed on the main screen display.



BrightStat LUA Script Testing and Checkout Procedure

1. Lower cooling set point 1° below room temperature. Make sure CO_2 level is below CO_2 min setting. Use cold spray on outdoor sensor. Unit must run in economizer cooling mode with "Economizer Active" displayed on BrightStat.
2. Lower cooling set point 2° below room temperature. Make sure CO_2 level is above CO_2 min setting. Use cold spray on outdoor sensor. Unit must run in compressor cooling mode with no messages displayed on BrightStat.
3. Raise cooling set point above room temperature. Make sure CO_2 level is above CO_2 min setting. Unit must run ventilation mode only with "CO_2 Active" displayed on BrightStat.
4. Raise cooling set point above room temperature. Make sure CO_2 level is below CO_2 min setting. Unit must be inactive with no messages on BrightStat.

Service Menus