BC24 Weather Advanced Programming Manual

July 2018

Revisions

None

Using the REST Interface built into BC24 Weather

Set up your BC24 Weather system as shown in the BC24 Weather Assembly Manual.

Testing the REST Interface

Now that you have BC24 Weather setup and working, it's time to test the first REST command.

Open a browser (Chrome, Safari, Internet Explorer or Edge - if your browser doesn't work, download and install Chrome) and type in the following (substitute your BC24 Weather IP address for 192.x.x.x. Watch the screens as the BC24 Weather boots up after connecting to WiFI.):

http://192.168.1.118/FullDataString

returns:

{"FullDataString": "22.70,36.40,23.44,102067.00,590.66,0.00,0.00,45.00,0.00,0.00,0.00,0.00,0.00,0.00,45.00,0,2018-07-24 12:21:53,,0,-1,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,V:1,WXLMB ,0,,,0,,,0,23.35,40.42", "id": "1", "name": "BC24Weather", "hardware": "esp32", "connected": true}

Which contains a bunch of weather information from the BC24 Weather station.   Note: Your FullDataString will have more information in it if you are using software version 002 or later.

After succeeding with the test, you now have access to all of these REST commands.

Default BC24 Weather REST Admin Password

admin

Change it if you want security!

REST Variables

For example, to access the BC24 Weather REST variables type into a browser:

http://192.168.1.118/FullDataString

returns:

{"FullDataString":
"22.70,36.40,23.44,102067.00,590.66,0.00,0.00,45.00,0.00,0.00,0.00,0.00,0.00,0.00,45.00,0,20
18-07-24 12:21:53,,0,-1,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,V:
1,WXLMB ,0,,,0,,,0,23.35,40.42", "id": "1", "name": "BC24Weather", "hardware": "esp32",
"connected": true}

REST Variables

Variable	Return	Example
No Variable	All variables in JSON format	`{"variables": {"BC24WeatherTime": "2018-07-24 12:23:26", "FullDataString": "22.70,36.50,23.40,102070.00,590.37,0.00,0.00,45.00,0.00,0.00,0.00,0.00,0.00,45.00,45.00,0,2018-07-24 12:23:26,,0,-1,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,V:1,WXLMB ,0,,,0,,,0,23.31,40.52", "FirmwareVersion": "002", "currentLEDMode": 0, "OLEDOn": 1, "darkLight": 1, "ClockTimeOffsetToUTC": -25200, "BMPTemperature": 23.40, "BarometricPressure": 102070.00, "Altitude": 590.37, "InsideTemperature": 23.31, "InsideHumidity": 40.52, "OutdoorTemperature": 22.70, "OutdoorHumidity": 36.50, "CurrentWindSpeed": 0.00, "CurrentWindGust": 0.00, "CurrentWindDirection": 45.00, "EnglishOrMetric": 0, "RainTotal": 0.00, "WindSpeedMin": 0.00, "WindSpeedMax": 0.00, "WindGustMin": 0.00, "WindGustMax": 0.00, "WindDirectionMin": 45.00, "WindDirectionMax": 45.00, "AirQualitySensor": 0, "ThunderBoardLast": ",,0,,,0", "ThunderBoardParams": "", "ESP32HeapSize": 165000}, "id": "1", "name": "BC24Weather", "hardware": "esp32", "connected": true}`
BC24WeatherTime	BC24 Weather Time and Date	`{"BC24WeatherTime": "2018-07-24 12:25:18", "id": "1", "name": "BC24Weather", "hardware": "esp32", "connected": true}`
FullDataString	String of Weather Data	See description of the FullDataString after this table

REST Variables

FirmwareVersion	Which software version is BC24 Weather running	`{"FirmwareVersion" : "002", "id": "1", "name": "BC24 Weather", "connected": true}`
BMPTemperature	Temperature sensor on BMP280 on the WeatherPlus board. Always reports in degrees C.	`{"BMPTemperature": 27.47, "id": "1", "name": "BC24 Weather", "connected": true}`
BarometricPressure	Barometric Pressure sensor on BMP280 on the WeatherPlus board. Always reports in Pascals.	`{"BarometricPressu re": 100958.00, "id": "1", "name": "BC24 Weather", "connected": true}`
Altitude	Altitude calculated from BMP280. Always reports in meters.	`{"Altitude": 682.52, "id": "1", "name": "BC24 Weather", "connected": true}`
InsideTemperature	HDC1080 Inside Temperature. Always in C	`{"InsideTemperatur e": 23.23, "id": "1", "name": "BC24Weather", "hardware": "esp32", "connected": true}`

REST Variables

InsideHumidity	HDC1080 Inside Humidity. Always reports in % RH	`{"InsideHumidity": 40.72, "id": "1", "name": "BC24Weather", "hardware": "esp32", "connected": true}`
OutdoorTemperature	Outdoor Temperature from the AM2315. Always reports in degrees C.	`{"OutdoorTemperature": 23.60, "id": "1", "name": "BC24 Weather", "connected": true}`
OutdoorHumidity	Outdoor Relative Humidity from the AM2315. Always reports in % RH.	`{"OutdoorHumidity": 35.70, "id": "1", "name": "BC24 Weather", "connected": true}`
CurrentWindSpeed	Current Wind Speed from the WeatherRack - Always reports in kph (kilometer per hour).	`{"CurrentWindSpeed": 0.00, "id": "1", "name": "BC24 Weather", "connected": true}`
CurrentWindGust	Current Wind Speed from the WeatherRack - Always reports in kph (kilometer per hour).	`{"CurrentWindGust": 18.00, "id": "1", "name": "BC24 Weather", "connected": true}`

REST Variables

CurrentWindDirection	Current Wind Direction from the WeatherRack - Always reports in degrees. 0 = due North.	`{"CurrentWindDirection": 90.00, "id": "1", "name": "BC24 Weather", "connected": true}`
EnglishOrMetric	Is the Weather DISPLAY set to English or Metric units. 0 means English units, 1 means Metric units. The REST interface always sends Metric unit.	`{"EnglishOrMetric": 0, "id": "1", "name": "BC24 Weather", "connected": true}`
RainTotal	Current Rain Total since last reboot of WeatherPlus. Always reports in mm.	`{"RainTotal": 0.28, "id": "1", "name": "BC24 Weather", "connected": true}`
WindSpeedMin	Wind Speed Minimum as calculated by WeatherPlus over the past 50 seconds. Always reports in kph.	`{"WindSpeedMin": 0.00, "id": "1", "name": "BC24 Weather", "connected": true}`
WindSpeedMax	Wind Speed Maximum as calculated by WeatherPlus over the past 50 seconds. Always reports in kph.	`{"WindSpeedMax": 2.50, "id": "1", "name": "BC24 Weather", "connected": true}`

REST Variables

WindGustMin	Wind Gust Minimum as calculated by WeatherPlus over the past 50 seconds. Always reports in kph.	`{"WindGustMin": 0.00, "id": "1", "name": "BC24 Weather", "connected": true}`
WindGustMax	Wind Gust Maximum as calculated by WeatherPlus over the past 50 seconds. Always reports in kph.	`{"WindGustMax": 6.50, "id": "1", "name": "BC24 Weather", "connected": true}`
WindDirectionMin	Wind Direction Minimum as calculated by WeatherPlus over the past 50 seconds. Always reports in degrees - 0 is due north.	`{"WindDirectionMin": 0.00, "id": "1", "name": "BC24 Weather", "connected": true}`
WindDirectionMax	Wind Direction Minimum as calculated by WeatherPlus over the past 50 seconds. Always reports in degrees - 0 is due north.	`{"WindDirectionMax": 275.00, "id": "1", "name": "BC24 Weather", "connected": true}`
AirQualitySensor	Instantaneous Air Quality. Reports a value from 0 (very clean) to ~32000 (very dirty). See the BC24 Weather Air Quality Extender Manual on www.switchdoc.com on the store.	`{"AirQualitySensor": 1400, "id": "1", "name": "BC24 Weather", "connected": true}`

REST Variables		
ThunderBoardLast	Returns all the current lightning information from BC24 Weather. Requires BC24 Weather Lightning Extender Kit	`{"ThunderBoardLast": "20 km, 03/31/2018 14:37:54,20,Lightning detected, 03/31/2018 14:37:54,1", "id": "1", "name": "BC24 Weather", "connected": true}`
ThunderBoardParams	Returns the current ThunderBoard Parameters. Requires BC24 Weather Lightning Extender Kit	`{"ThunderBoardParams": "2,1,7,0,2,2", "id": "1", "name": "BC24 Weather", "connected": true}`

Format of the specialized JSON for the ThunderBoardLast response:

   as3935_LastLightning - Distance of the last lightning strike (e.g. 7km)
   as3935_LastLightningTimeStamp - Time of the last lightning strike
   as3935_LastLightningDistance - integer distance (e.g. 7)
   as3935_LastEvent - The last event recorded by the ThunderBoard (see below)
   as3935_LastEventTimeStamp - Time Stamp of last event
   as3835_LightningCountSinceBootup - Number of lightning strikes since bootup

Format of the specialized JSON for the ThunderBoardParms response:

 as3935_NoiseFloor - Current Noise Floor (0-7)
 as3935_Indoor - Indoor (0) Outdoor (1)

as3935_TuneCap - Current Tune Cap value for the AS3935 (0-15)
as3935_DisturberDetection - 0 - detect and report disturbers 1 - do not report
as3935_WatchdogThreshold - WatchDog Threshold (0-15)
as3935_SpikeDetection - Spike Rejection Value (0-15)

Structure of the FullDataString Return Value

{"FullDataString":
"22.60,36.60,23.41,102066.00,590.74,0.00,0.00,45.00,0.00,0.00,0.00,0.00,0.00,0.00,45.00,0,20
18-07-24 12:34:14,,0,-1,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,V:
1,WXLMB ,0,,,0,,,0,23.26,40.81", "id": "1", "name": "BC24Weather", "hardware": "esp32",
"connected": true}

The values in the FullDataString are all in metric.   See metric units in the above table.

- Outdoor Temperature
- Outdoor Humidity
- BMP280 Temperature
- Barometric Pressure
- Altitude
- Current Wind Speed
- Current Wind Gust
- Current Wind Direction
- Rain Total
- Wind Speed Minimum
- Wind Speed Maximum
- Window Gust Minimum
- Window Gust Maximum
- Wind Direction Minimum
- Wind Direction Maximum
- Is Display English (1) Or Metric (0)
- Current Date/Time on BC24 Weather
- BC24 Weather Station Name
- Current Air Quality Sensor Reading
- Current Air Quality Qualitative Reading
- SunAIrPlus Battery Voltage
- SunAIrPlus Battery Current
- SunAirPlus Solar Panel Voltage
- SunAirPlus Solar Panel Current
- Load Voltage (into BC24 Weather)
- Load Current (into BC24 Weather)
- WXLink Battery Voltage
- WXLink Battery Current

- WXLink Solar Panel Voltage
- WXLink Solar Panel Current
- Always 0.00
- WXLink Load Current
- WXLink AM2315 Temperature Validation IVF: Means Invalid Temperature Found, V: Means Valid found
- WXLink Message Status: WXLMG - WXLink Last Message Good, WXLMB - WXLink Last Message Bad
- Alexa Enabled (1) or Not (0)
- as3935_LastLightning - Distance of the last lightning strike (e.g. 7km)
- as3935_LastLightningTimeStamp - Time of the last lightning strike
- as3935_LastLightningDistance - integer distance (e.g. 7)
- as3935_LastEvent - The last event recorded by the ThunderBoard (see below)
- as3935_LastEventTimeStamp - Time Stamp of last event
- as3835_LightningCountSinceBootup - Number of lightning strikes since bootup
- Inside Temperature
- Outside Temperature

Note: As more devices are added and supported by BC24 Weather, this string will continue to increase beyond these values, but only at the end of the string.

Mode Commands Available

Below is a list of the se

Mode	Value	Description	Status
BC24_WEATHER_MODE_OUTSIDE_TEMPERATURE	0	Shows Outside Temperature	Implemented
BC24_WEATHER_MODE_WINDSPEED_DIRECTION	1	Shows Current Windspeed and Wind Direction	Implemented
BC24_WEATHER_MODE_OUTSIDE_HUMIDITY	2	Shows Outside Humidity	Implemented
BC24_WEATHER_MODE_INSIDE_TEMPERATURE	3	Shows Inside Temperature	Implemented
BC24_WEATHER_MODE_INSIDE_HUMIDITY	4	Shows Inside Humidity	Implemented

Mode	Value	Description	Status
BC24_WEATHER_MODE_BP_TREND	5	Show Current Barometric Trend	Not Implemented
BC24_WEATHER_MODE_LIGHTNING	6	Shows Lighting Status and Events	Not Implemented
BC24_WEATHER_MODE_AIRQUALITY	7	Shows Current Air Quality	Not Implemented
BC24_WEATHER_MODE_NO_ROTATE_BLANK	20	Blank all BC24 LEDs	Implemented
BC24_WEATHER_MODE_NO_ROTATE_RAINBOW	21	Displays Rainbow of various colors	Implemented
BC24_WEATHER_MODE_NO_ROTATE_DOWJONES	22	Displays Current State of the Dow Jones Average	Not Implemented
BC24_WEATHER_MODE_NO_ROTATE_FIRE	23	Displays Fire LEDs - Looks great behind paper or reflection	Implemented
BC24_WEATHER_MODE_NO_ROTATE_CLOCK	24	Displays 12 hour clock from BC24 Weather Time	Implemented
BC24_WEATHER_MODE_NON_IMPLEMENTED	100	Indicates a non-implemented feature to the BC24 Weather Software	Implemented

REST Commands

REST Commands

Variable	Function	Parameters	Returns
arduino	For ArduinoiConnect	Not Implemented	
	External commands		
setID	sets the ID of the BC24 Weather at the IP address. Returned in "id" field	http://192.168.1.118/setID?params=2 Parameter is the new ID. Alphanumeric allowed	`{"return_value": 1, "id": "2", "name": "BC24 Weather", "connected": true}` – Note new ID#
resetBC24 Weather	Restarts BC24 Weather to default. Works most of the time on the BC24.	http://192.168.1.118/resetBC24Weather?params=adminpassword Paramater is administration password	return_value will be 1 if reset command was accepted, 0 if not (as in password failure)
setAdminPassword	reset Administration Password	http://192.168.1.118/setAdminPassword?params=oldpassword,newpassword Parameters are old and new password, separated by a ","	return_value will be 1 if the command succeeded and 0 if it did not (such as invalid password)
resetToDefaults	reset BC24 Weather to default values	Not Implemented	Not Implemented

REST Commands

resetWiFiAccessPoint	resets BC24 Weather Access Point values to initial values.	http://192.168.1.118/resetWiFiAccessPoint?params=adminpassword Parameter is administration password	return_value is 1 if it succeeds (and you will never receive it if it does) or 0 if the password fails.
setCurrentLEDMode	Sets the mode for the BC24 Display. See mode values above.	http://192.168.1.118/setCurrentLEDMode?params=adminpassword, mode	return_value is 1 if it succeeds (and you will never receive it if it does) or 0 if the password fails.
setOLEDOn	Turns the OLED Display Off (0)- Changes Sampling Mode to every 2 seconds versus about 10 with OLED On (1)	http://192.168.1.118/setOLEDOn?params=adminpassword, mode Parameter is administration password	return_value is 1 if it succeeds (and you will never receive it if it does) or 0 if the password fails.
setDarkLight	Sets the BC24 LEDs Darker (0) or Brighter (1)	http://192.168.1.118/setDarkLight?params=adminpassword, mode Parameter is administration password	return_value is 1 if it succeeds (and you will never receive it if it does) or 0 if the password fails.
setClockTimeOffsetToUTC	Sets Time Offset to seconds from UTC. For example, Pacific Standard Time is -25200	http://192.168.1.118/setClockTimeOffsetToUTC?params=adminpassword, offset Parameter is administration password	return_value is 1 if it succeeds (and you will never receive it if it does) or 0 if the password fails.

REST Commands			
	External Interfaces		
enableCWOP	Enables the CWOP interface for BC24 Weather	Not Implemented	Not Implemented
enableTwitter	Enables the Twitter Interface for BC24 Weather	Not Implemented	Not Implemented
	Weather Display Functions		
WeatherSmall	Sets the BC24 Weather OLED display to small characters	http://192.168.1.118/ WeatherSmall	return_value is 1
WeatherMedium	Sets the BC24 Weather OLED display to medium characters	http://192.168.1.118/ WeatherMedium	return_value is 1
WeatherLarge	Sets the BC24 Weather OLED display to large characters	http://192.168.1.118/ WeatherLarge	return_value is 1

REST Commands

WeatherDemo	Sets the BC24 Weather OLED display to Demo mode. Senses and moves fast showing values that people can quickly change like outside temperature/ humidty, wind speed, direction and rain. Used in classroom demonstrations where the instruments are located for people to change and turn.	http://192.168.1.118/ WeatherDemo	return_value is 1
EnglishUnits	Sets the BC24 Weather OLED display to show English Units	http://192.168.1.118/ EnglishUnits	return_value is 1
MetricUnits	Sets the BC24 Weather OLED display to show Metric	http://192.168.1.118/ MetricUnits	return_value is 1

REST Commands

EnablePubNub	Enable/disable PubNub (Alexa) on BC24 Weather - sets the Pub and Sub keys	http://http://192.168.1.102/EnablePubNub?params=admin,1,pub-c-cc4d6662-190a-42af-a14d-3be4e6040ff6,sub-c-47725a16-f0e7-11e7-9869-a6bd95f83dd1 Admin password is first parameter. Second parameter is Enable (1) or Disable (0) Alexa. Third Parameter is the MQTT PubNub Publish Key and the Fourth Parameter is the MQTT PubNub Subscribe Key	As of BC24 Weather software version 002, return_value will be 0 if password fails, 1 if the set pub/sub key succeeds
SendPubNubState	Sends an MQTT Message to the PubNub site. Great to start things out.	http://192.168.1.102/SendPubNubState?params=admin First Parameter is the Admin password	return value is 1
setThunderBoardParams		http://192.168.1.146/setThunderBoardParams?params=admin,2,1,7,0,2,2 The numbers after the password contain the parameters to be set. Some order as reported in the ThunderBoardParm variable above	return value 0 if fails password return value of 1 if successful return value of 2 means illegal parameter value

How to Program Your BC24 Weather

Download the Arduino IDE 1.8.5 (or higher) to start from arduino.cc

Installation of the IDE

See the Tutorial on:

http://www.switchdoc.com/2018/07/tutorial-arduino-ide-esp32-bc24/

Settings for Alexa and BC24 Weather

Not Released Yet

Settings for WXLink / Solar WXLink

Not Released Yet

Settings for BC24 Weather Solar Power Extender Kit

Not Released Yet

Settings for BC24 Weather ThunderBoard Lightning Detector Extender Kit

Not Released Yet

Setting up the BC24 Weather Twitter Interface

Not Released Yet

Setting up the BC24 Weather CWOP Interface

Not Released Yet

Setting up the BC24 Weather WeatherUnderground Interface

See the BC24 Weather WeatherUnderground Manual