

## MaxAir Technical – Communication with an eBUS enabled Boiler

### eBUS Background

eBUS (energy bus) is a 2-wire digital serial data-bus communication interface used in heating and solar energy appliances, by mainly German manufacturers. It was originally proposed by the Karl Dungs company, and has since been adopted by several other manufacturers. The eBUS interface has also been used by home-automation enthusiasts to connect their domestic solar or heating system to a networked PC for monitoring or remote control.

The eBUS 2-wire interface is an asynchronous serial port with active-low voltage that exchanges 8-bit bytes with start and (single) stop bits (no parity bit), at a symbol rate of 2400 baud, and can be implemented with a standard UART plus a voltage converter. It differs from the RS-232 interface, from which it is derived, in that the voltage levels were chosen to allow the bus also to supply power to bus participants, that can use a voltage stabilizer to derive an internal 5 V supply:

logical 0 = 9–12 volt

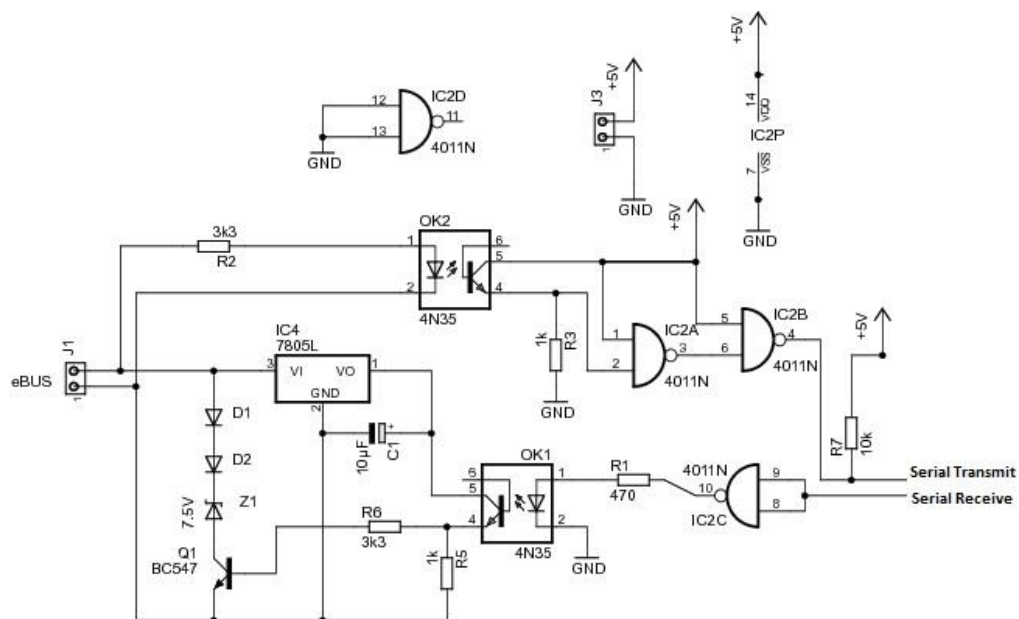
logical 1 = 15–24 volt (typical: 20 V)

### Interfacing to MaxAir

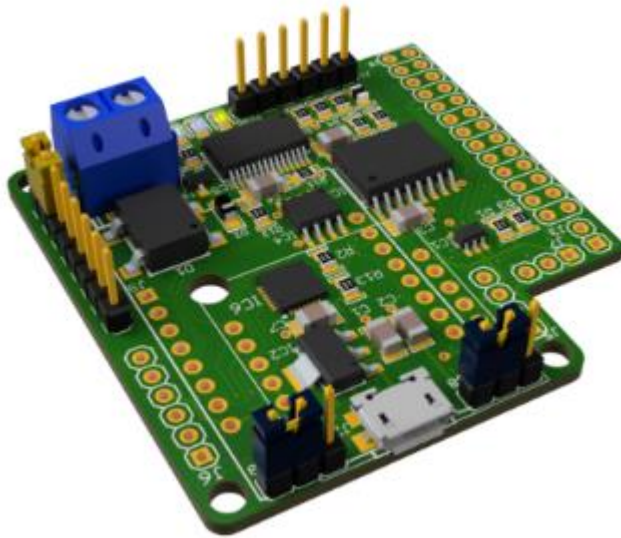
MaxAir need to be able to communicate with eBUS at both the hardware and software levels.

#### Hardware

It is possible to construct a relatively simple interface to connect an eBUS interface to the MaxAir controller's serial interface:



An alternative is to purchase a ready built and slightly more sophisticated version from [Welcome to eBUS Adapter 3! \(ebusd.eu\)](http://Welcome to eBUS Adapter 3! (ebusd.eu))



## Software

It is possible to construct code to send and receive eBUS messages but by far the simplest approach is to use 'ebusd' which is available via [Home · john30/ebusd Wiki \(github.com\)](https://github.com/john30/ebusd/wiki)

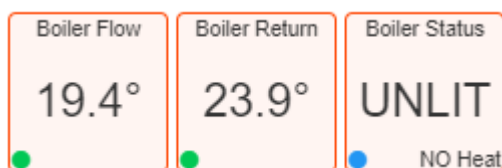
Once this daemon has been installed and configured, it can be added as a background service and can be interacted with by using the 'ebusctl' command.

## MaxAir Integration

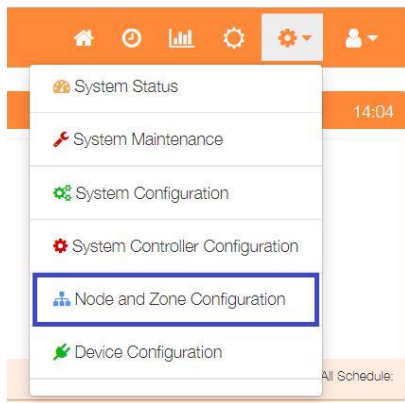
- A new Python script '/var/www/cron/ebus/ebus.py' has been added to interface between 'ebusd' and the MaxAir 'messages\_in' queue.
- A new table 'ebus\_messages' has been added for the 'ebusd' formatted messages.
- The existing 'Message Sensors' together with the 'Dummy Node' capabilities are used to display the eBUS captured data on the MaxAir Home screen.

## Example Implementation

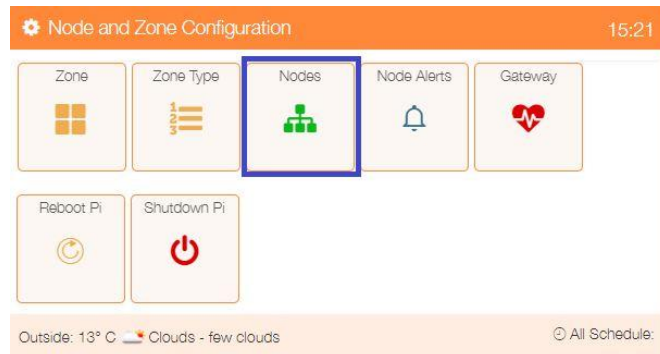
This example will display three tiles on the Home screen, to show Flow Temperature, Return Temperature and Boiler Status.



## Step 1 – Create a Dummy Node



Select 'Node and Zone Configuration' from the Settings dropdown list, then click the 'Sensors' button.



Node Setting

You can Add GPIO, I2C relay board as Node, Wireless Nodes are automatically discovered.

Type	Node ID	Max Number of Child IDs	Name	

Close

Add Node

Click on 'Add Node'.

Add a 'Dummy' node type, the 'Node ID' can be any not currently in use, select 'Dummy Sensor' for the 'Node Name' and for this example the 'Number of Devices attached to Node' will be 3.

Add Node

You can Add GPIO, I2C relay board as Node, Wireless Nodes are automatically discovered.

Node Type Node you want to make available for Zone and Boiler controller:  
Dummy

Node ID I2C board ID or 0 if you want to use Raspberry Pi GPIO:  
100

Node Name Identification for the Dummy Device:  
Dummy Sensor

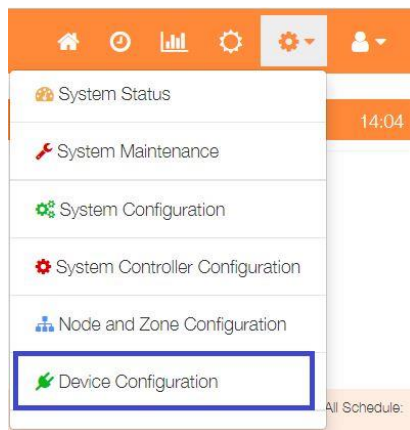
Number of Child Devices attached to Node Number of Attached Devices:  
3

Close

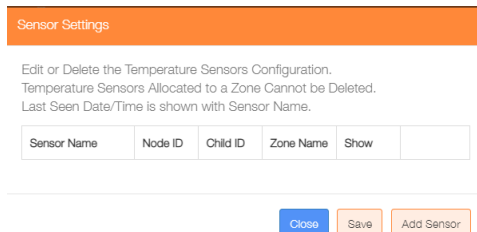
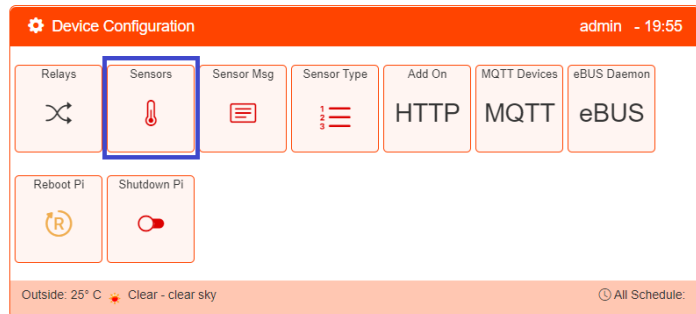
Save

value  
Name  
Child

## Step 2 – Create Sensors

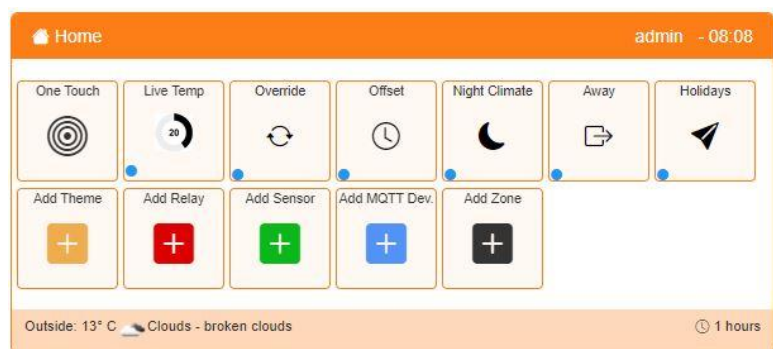


Select 'Device Configuration' from the Settings dropdown list, then click the 'Sensors' button.



Click on the 'Add Sensor' button to configure the first sensor

An alternative method to go directly to the Add Sensor dialogue, is from the Home screen click on the 'One Touch' button then select the 'Add Sensor' menu item.



Add a new Sensor for the 'Boiler Flow' temperature using the 'Dummy' node created above and 'Sensor Child ID' set to 0.

Add Sensor

12:35

☐ Before System Controller When Sensor is NOT Allocated to a Zone, Locate Tile either Before or After the System Controller Tile on the Home Screen

Index Number In the List of sensors where you want to place this sensor on home screen

15

Sensor Type Temperature, Humidity, etc

Temperature

Sensor Name Select either Outside Weather or Sensor to be used to calculate the Start Time Offset Applied.

Boiler Flow

Sensor ID Node ID for the Sensor

100 - Dummy Sensor

Sensor Child ID Node Child ID for the Sensor

0

Mode Sensor Readings Captured either Continuously or Only on Value Change

Continuous

Timeout On Change Mode - maximum interval in Minutes between Sensor readings if no Value Change

0

Sensor Resolution Resolution between +/- 0.0 to 1.0

0

Sensor Correction Factor Positive or Negative Correction Factor

0.00

Frost Protection The System will protect itself against frost, To Disable protection you can set the temperature to 0

0

Submit

Cancel

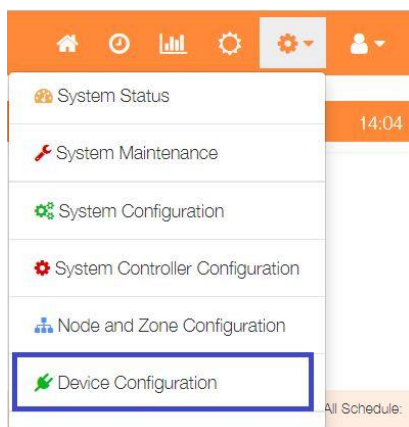
Outside: 22° C ☁ Clouds - scattered clouds

Repeat the procedure for the 'Boiler Return', but this time use 'Sensor Child ID' set to 1.

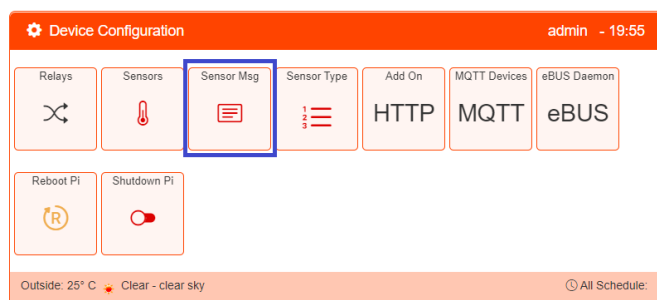
In order to display the Boiler Status we need to create a Message Sensor using the same 'Dummy' node created above, in this case use 'Sensor Child ID' set to 2.

The 'Add Sensor' form is displayed with an orange header bar containing a plus icon and the text 'Add Sensor' on the left, and the time '12:35' on the right. Below the header, there is a checkbox labeled 'Before System Controller' with a note: 'When Sensor is NOT Allocated to a Zone, Locate Tile either Before or After the System Controller Tile on the Home Screen'. A text input field for 'Index Number' contains the value '17'. Below this is a label 'Sensor Type Temperature, Humidity, etc' followed by a dropdown menu currently showing 'Message'. A label 'Sensor Name' with a note 'Select either Outside Weather or Sensor to be used to calculate the Start Time Offset Applied.' is followed by a text input field containing 'Boiler Status'. Below that is a label 'Sensor ID Node ID for the Sensor' followed by a text input field containing '100 - Dummy Sensor'. Another label 'Sensor Child ID Node Child ID for the Sensor' is followed by a text input field containing '2'. At the bottom of the form are two buttons: 'Submit' and 'Cancel'. A footer bar shows 'Outside: 22° C' with a cloud icon and the text 'Clouds - scattered clouds'.

#### Step 4 – Create Sensors Messages



Select 'Device Configuration' from the Settings dropdown list, then click the 'Sensors Msg' button.



Custom Sensor Messages

Map Message Code to Message Text

Sensor	Msg ID	Type	Message	Color	

Close
Add Msg

To start building the message mapping, click on the 'Add Msg' button.

For a centre message and associated status icon color:

Add Message

Map Message Code to Message Text, and Set Status Icon Colour

Sensor Select Message Sensor to which this Message will be attached

Boiler Status

Msg ID Code returned as Sensor Value

22

Text Position Select position on tile for text, either Center or Lower Right

Center

Message Text Message Text to be displayed

F22

Status Color Lower Left Status Icon Colour

red

Close
Save

Select the Message Sensor

Add the Message numeric code

Select message position

Enter the text to be displayed

Set the associated status icon colour (HEX color codes can be used)

Click 'Save' when completed.

For a lower right message:

Add Message

Map Message Code to Message Text, and Set Status Icon Colour

Sensor Select Message Sensor to which this Message will be attached

Boiler Status

Msg ID Code returned as Sensor Value

4

Text Position Select position on tile for text, either Center or Lower Right

Lower Right

Message Text Message Text to be displayed

Burner ON

Status Color Lower Left Status Icon Colour

Leave Blank for Lower Right Messages

Close
Save

Select the Message Sensor

Add the Message numeric code

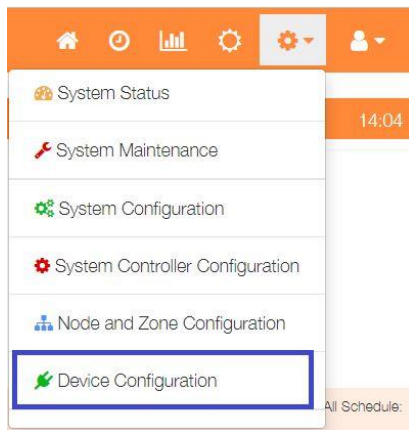
Select '1' for lower right message

Enter the text to be displayed

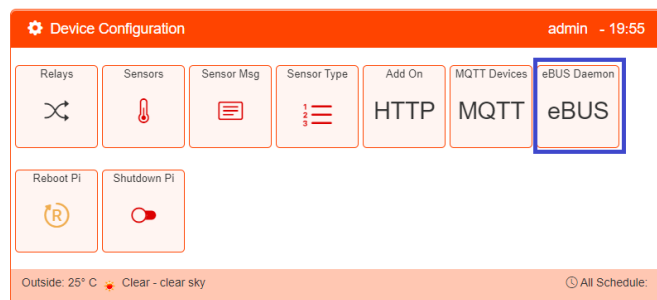
Leave Blank

Click 'Save' when completed.

## Step 5 – Create eBUS Command Messages



Select 'Device Configuration' from the Settings dropdown list, then click the 'eBUS Daemon' button.

A screenshot of the 'EBus Daemon' configuration page. The page has an orange header with the title 'EBus Daemon' and a document icon. Below the header, there is a text label 'Attach EBus Command Messages to a Sensor'. Underneath, there is a table with four columns: 'Message', 'Text Position', 'Offset', and 'Sensor'. Below the table, there are two buttons: 'Close' and 'Add Command'.

Click on the 'Add Command' button.

A screenshot of the 'Add EBus Command' form. The form has an orange header with the title 'Add EBus Command'. Below the header, there is a text label 'Map EBus Message to Sensor for returned data and Select Type'. The form contains several input fields: 'Sensor Select Sensor to which this Message will be attached' (a dropdown menu with 'Boiler Status' selected), 'Message Text EBus Message to be sent to the ebusd Daemon' (a text input field with 'StateNumber' entered), 'Text Position Select position on tile for text, either Centre or Lower Right' (a dropdown menu with 'Lower Right' selected), and 'Offset Numeric Offset Value to be added to the EBus returned value.' (a text input field with '0' entered). At the bottom, there are two buttons: 'Close' and 'Save'.

Select the Sensor created above

Enter the message to be sent to the 'ebusd' daemon

Select which position the response data will be positioned

Add any numeric offset to be applied to the response data

Click on 'Save' to store new message

Repeat for any other eBUS messages to be used.



Below is an example of typical eBUS and Custom Sensor message entries.

### EBus Daemon

Attach EBus Command Messages to a Sensor

Message	Text Position	Offset	Sensor	
FlowTemp	Center	0	Boiler Flow	
ReturnTemp	Center	0	Boiler Return	
ACRoomthermostat	Center	0	Boiler Target	
Flame	Center	90	Boiler Status	
StateNumber	Lower Right	0	Boiler Status	

Close
Add Command

### Custom Sensor Messages

Map Message Code to Message Text

Sensor	Msg ID	Text Position	Message	Color	
Boiler Status	22.00	Center	F22	red	
Boiler Status	0.00	Center	CLEAR	#00C853	
Boiler Status	72.00	Center	F11	red	
Boiler Status	0.00	Lower Right	NO Heat		
Boiler Status	1.00	Lower Right	Fan Pre		
Boiler Status	2.00	Lower Right	Pump Pre		
Boiler Status	3.00	Lower Right	Ignition		
Boiler Status	4.00	Lower Right	Burner ON		
Boiler Status	5.00	Lower Right	Overrun		
Boiler Status	6.00	Lower Right	Fan Over		
Boiler Status	7.00	Lower Right	Pump Over		
Boiler Status	8.00	Lower Right	Anti-Cycle		
Boiler Status	30.00	Lower Right	NO Heat		
Boiler Status	53.00	Lower Right	Waiting		
Boiler Status	98.00	Lower Right	Over Heat		
Boiler Status	90.00	Center	UNLIT	#2196F3	
Boiler Status	91.00	Center	LIT	red	

Close
Add Msg

### Schedule Jobs

Configure Jobs to run every set interval and enable creation of a Log file if required.

Job Name	Script Name	Enabled	Log Job	Run Every	
controller	/var/www/cron/cc	<input checked="" type="checkbox"/>	<input type="checkbox"/>	60	
db_cleanup	/var/www/cron/dt	<input checked="" type="checkbox"/>	<input type="checkbox"/>	02:00	
check_gw	/var/www/cron/ct	<input checked="" type="checkbox"/>	<input type="checkbox"/>	60	
system_c	/var/www/cron/sy	<input checked="" type="checkbox"/>	<input type="checkbox"/>	300	
weather_up	/var/www/cron/w	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1800	
reboot_wifi	/var/www/cron/nr	<input checked="" type="checkbox"/>	<input type="checkbox"/>	120	
check_ds18	/var/www/cron/ct	<input type="checkbox"/>	<input type="checkbox"/>	60	
sw_install	/var/www/cron/sv	<input checked="" type="checkbox"/>	<input type="checkbox"/>	10	
update_cod	/var/www/cron/uq	<input type="checkbox"/>	<input type="checkbox"/>	00:00	
check_gpio	/var/www/cron/ct	<input type="checkbox"/>	<input type="checkbox"/>	60	
notice	/var/www/cron/hc	<input checked="" type="checkbox"/>	<input type="checkbox"/>	60	
console2	/var/www/cron/uq	<input checked="" type="checkbox"/>	<input type="checkbox"/>	60	
auto_backu	/var/www/cron/at	<input checked="" type="checkbox"/>	<input type="checkbox"/>	01:00	
ebus	/var/www/cron/ct	<input checked="" type="checkbox"/>	<input type="checkbox"/>	60	

Add Job
Apply
Close

Step 6 – Enable the ‘ebus’ Job in the scheduler.