

Product Specification

Model Number :
Model Name :
Customer : **AirFixture**
Customer Model Number : 3000.0050.00
Department : **ENGINEERING – CTL**
Revision (X1,X2...A1,A2...1,2...) : **A1**
Date (MM-DD-YYYY) : **01-17-2019**
Number of Pages (included front page) : **6**
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Revision

Date	Rev.	Prepared by	History
May 30, 2018	X0.1	Salus NA Eng.	Initial Release.
Jun 14, 2018	X1	Salus NA Eng.	Add Operation and Control
Jul 22, 2018	X2	Salus NA Eng.	Minor changes
Oct 2, 2018	X3	Salus NA Eng.	Power source, antenna details Update LED indication and Operation Change terminals from 4 pin to 2 x 2 pin
Oct 17, 2018	X4	Salus NA Eng.	Add average power consumption Update LED indication
Jan 17, 2019	A1	CTL	Formal release to system

1. Appearance and Outlook

1.1 Appearance

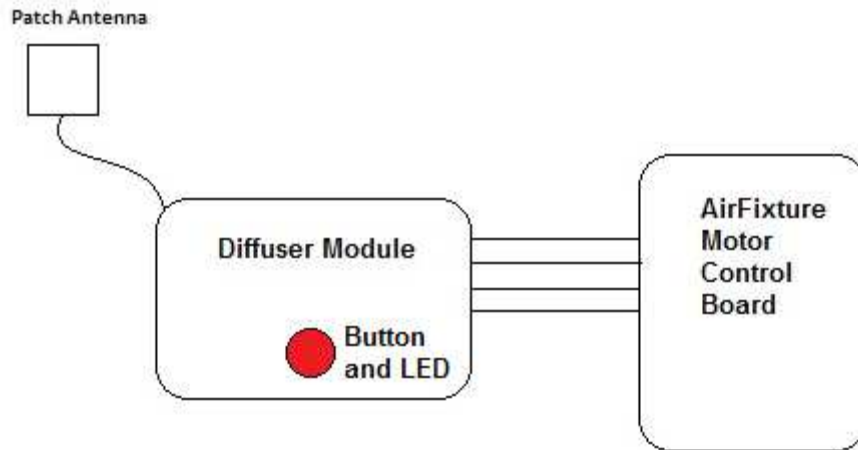
The physical form of this module is a PCB Assembly without any plastic casing.

A patch antenna connected to the module by a 0.5m shielding cable.

A four pins socket connector for connecting AirFixture motor control board's UART port.

A button will be used for setup of the diffuser module. A LED below the button shall be used for indication and also guiding installer for easier locating the button. The button LED shall be turned off after successful installation.

The physical size of the board should be able to fit into the diffuser assembly of AirFixture and able to connect to the AirFixture motor control board.



1.2 Outside dimension

81.2Lx45.8Wx10H (mm)

2. Application

2.1 Expected Use

This diffuser module will work with the concentrator module to form a system to control level of opening of the underfloor diffuser. It is a ZigBee based RF module that request heat/cool fan speed levels from concentrator. The level is in the range of 0-10V with a resolution of 2V. It will translate the voltage level to diffuser opening level and communicate with diffuser control board through UART.

The diffuser module is a ZigBee battery operated end device so maintaining a good power management is required.

2.2 Feature List

- ZigBee base communication work as wire replacement for Airfixture diffuser system.
- Lower power consumption for battery power.
- Bi-colors LED and button for setup and status indication.
- External Patch antenna to extent the RF operation range.

3. Specification

3.1 Total Weight

Whole module with Patch antenna	TBD
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3.2 Power

Power Source	DC7.2V, 100mA max. unregulated power from Motor control board battery. (i.e. From 6V to 9V)
Average power consumption	The average current of the Diffuser module is 200uA at 3V or 100uA at 7.2V.
Expected Battery Life (on Motor Control board)	5 Years for whole Diffuser module and Motor control board.

3.3 Keyboard

Key type	Tact switch
Number of keys	1
Key backlight	Red/Green Bi-color LED

3.4 External Connection

Two Pins socket for power with polarity protection	Power supply Input Connector <ul style="list-style-type: none"> Pin 1: +7.2V unregulated battery input Pin 2: GND Connector type: TBD
Two Pins socket for UART with polarity protection	UART Connector <ul style="list-style-type: none"> Pin 1: Rx (UART Rx) Pin 2: Tx (UART Tx)
Remark:	Both connectors should use Molex 22-23-2021 or compatible terminals

3.5 External Antenna

Antenna type	PCB Patch antenna, <ul style="list-style-type: none"> PCB: FR4 D/S, 42.7x48.7x0.8mm (TBD) Covered by rubber dipping (TBD)
Connection	Dia 3mm x 0.5m RF shielded cable soldered on antenna and Diffuser module.

3.6 Memory

Non-volatile memory	Use MCU internal flash to store settings

3.7 EMC Protection:

ESD	NA
EFT	NA

3.8 Physical Protection:

Dust and water proof level	NA
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3.9 PCB

Module PCB	FR4, D/S, HAL, ROHS (TBD)
Patch antenna PCB	FR4, D/S, gold, ROHS (TBD)

3.10 Operating environment

Operating temperature	0°C – 50°C
Storage temperature	-10°C – 60°C
Relative humidity (non-condensed)	<95% RH

3.11 Agency approval

Regulation	FCC and IC
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3.12 Product life expectancy

Life expectancy	Target 10 years by design under operating environmental condition
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3.13 ZigBee

ZigBee with Power amplifier

Tx Power	Min.16dBm
Rx Sensitivity	Max.-95dBm

4 Packing & Accessories (TBD by Salus later)

Accessories	NA
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5 Operation and Control

5.1 LED

Priority	LED Indication	Description
1	Green LED on 2 seconds then OFF, go to Idle mode if device joins network already; Red LED on 2 seconds then OFF, go to Idle mode if device hasn't joined network before.	Power up
1	LED OFF	Idle mode
2*	Red LED flash once (red LED turn ON for 200ms then sleep for 4.8s, repeat the patten)	Motor board low battery
3*	Red LED flash 2 times (red LED blink at a rate of 100ms ON and 200ms OFF for two times then sleep for 4.4s, repeat the patten)	UART error
4*	Red LED flash 3 times	Lost link with Concentrat or parent
5*	Red LED flash 5 times	Motor board issue
6	Green LED ON	Identify
6	Green LED flash 3 times (green LED blink at a rate of 200ms ON and 200ms OFF for three times then OFF for 5 seconds, repeat the pattern.)	Joining Process

Note:

- 1 is the highest priority.
- * Red LED is flashing only in Identify mode. If there are mutilpile errors, only flash the higher priority error LED.

5.2 Reboot

After reboot, Diffuser module will inquiry the two analogue levels from Concentrator then pass to Motor board.

5.3 Idle mode

Diffuser module will run as idle mode all the time and will inquiry both analogue levels from Concentrator every 5 minutes then pass to Motor board.

5.4 Identify mode

5.4.1 In Idle mode, when the user presses and hold button more than 3 seconds but less than 10 seconds

If diffuser has not joined network:

- If there is no error, it will initiate joining process for 10 minutes, once it joins network, it will search OTA server and go to Idle mode;
- If it is low battery or other error, it will flash error LED for 5 minutes, it will not join network;
- The device will go to Idle mode immediately if button is pressed or hold.

If diffuser has joined network:

- It will rejoin and research OTA server, wake up for 5 minutes;
- If there is no error, it will Identify itself and tell motor board;
- If it is low battery or other error, it will flash red LED;
- The device will go to Idle mode immediately if button is pressed or hold.

5.4.2 When receive Identify from Concentrator

- It will research OTA server;
- If there is no error, it will Identify and tell motor board;
- If it is low battery or other error, it will flash red LED;
- The device will go to Idle mode immediately if button is pressed or hold.

5.4.3 Error LED Indication

In Identify mode, Red LED will start blinking when the following conditions met:

- Motor board low battery
- UART error (not receive UART response from motor board for 5 consecutive times, max 25 minutes)
- Lost link with Concentrator (not receive any response through ZigBee from concentrator for 5 consecutive times, max 25 minutes) or lost link with parent
- Motor board issue

5.5 Leave network

In Idle mode, when the user presses and hold button more than 10 seconds, the diffuser will leave network then reboot.

5.6 Zigbee Cluster

Device Type	Sleep end device
Endpoint	0x09
Scan network channel	15, 20 and 25
Long poll period	5 minutes

Server	Client
Basic (0x0000)	
Identify (0x0003)	
Manufacturer (0xFC00)	Manufacturer (0xFC00)
	OTA (0x0019)

Regulatory Information

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Radiation Exposure Statement

The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device, for example, USB dongle like transmitters is forbidden. This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: 2ARX3-CTLB3585 or Contains FCC ID: 2ARX3-CTLB3585"

when the module is installed inside another device, the user manual of this device must contain below warning statements;

1. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.

(2) This device must accept any interference received, including interference that may cause undesired operation.

2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

IC Statement:

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation of the device

Cet appareil contient des émetteurs / récepteurs exemptés de licence conformes aux RSS (RSS) d'Innovation, Sciences et Développement économique Canada. Le fonctionnement est soumis aux deux conditions suivantes :

- (1) Cet appareil ne doit pas causer d'interférences.
- (2) Cet appareil doit accepter toutes les interférences, y compris celles susceptibles de provoquer un fonctionnement indésirable de l'appareil.

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If the IC number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains IC: 24613-CTLB3585"

when the module is installed inside another device, the user manual of this device must contain below warning statements;

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

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