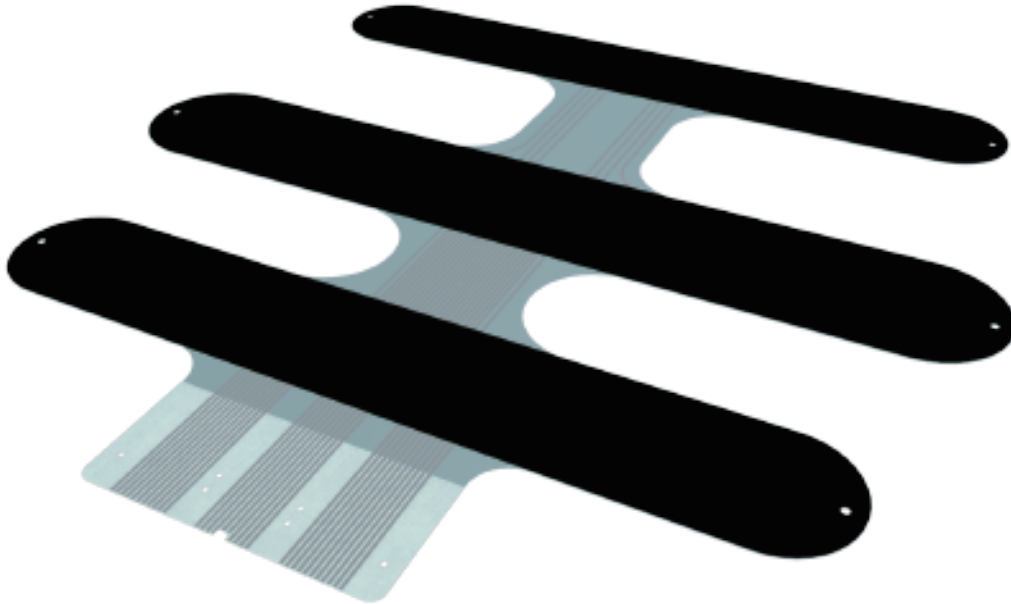


FSR Sensor Data Sheet



Introduction

This document describes about pressure sensor, MDXS-16-5610 of Marveldex Inc. This is composed of 31 each sensor cell, and resistance varies in inverse proportional to the pressure. When building a typical ADC measurement circuit using this attribute, one may obtain a voltage output in proportion to the force. This is especially for measuring the pressure of sitting. Based on measured value, you can distinguish various posture.

How to Use

We recommend you to use this sensor with Venus controller board and application. This sensor can be installed in a chair or a cushion. You can analyze the posture such as leaning laterally or leg-crossing.

Sensor Characteristics

Typical Performance

Unit	Description
Response time	< 10 μ sec
Operating temp	-20 $^{\circ}$ C ~ 60 $^{\circ}$ C
Storage temp	-30 $^{\circ}$ C ~ 60 $^{\circ}$ C
Operating Humidity	\leq 90%
Durability	2,000,000 stroke (100g) or over 500,000 stroke (150g)
Drift	< 5% per logarithmic time scale by constant load of 100g
Electric crosstalk (noise)	None
Power consumption	Consumes only while operating. Typically around 5mA, and maximum 20mA.
Resistance output range	∞ ~ 200 Ω
Sensing range (Per cell)	5g ~ 4kg
Number of cells	31 cells

Deviation

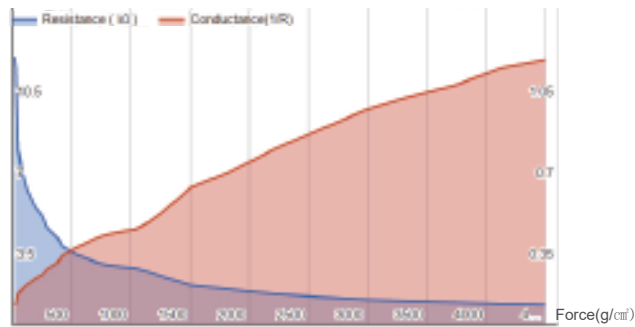
Unit	Description
Mechanical tolerance	\leq 50 μ m
Temperature influence	\leq 10%
Humidity influence	\leq 20%
Output deviation rate	Max 20%

Application Information

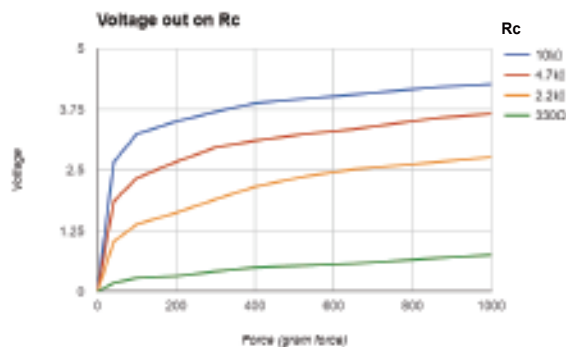
To view the output values, you can either measure the resistance using a multimeter or build an ADC circuit and measure the proportional value (conductance) to the inverse value of resistance. Building a simple circuit as shown below, you can obtain output values using the equation on the right. In the circuit diagram, Ra indicates FSR sensor resistance and Rc indicates reference pull-down resistance.



The output values may display a similar pattern as shown in the graph below. The color blue indicates resistance of the sensor and the red indicates the inverse number of resistance (conductance). The ADC output values from the circuit exhibit a similar pattern as the blue graph.



Looking at the conductance graph, it is evident that the slope value is high below 50g and low above 500g. Adjusting the Rc resistance value will alter the graph as shown below. If Rc value is increased, the resolution of lower weight is increased, and if Rc value is decreased, the resolution of higher weight is increased.

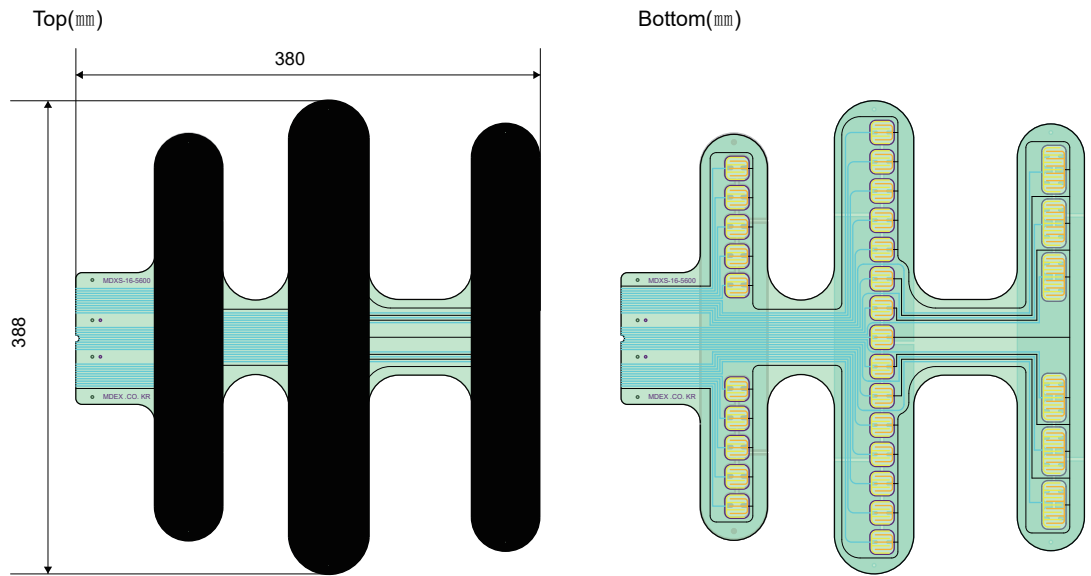


Model MDXS-16-5610

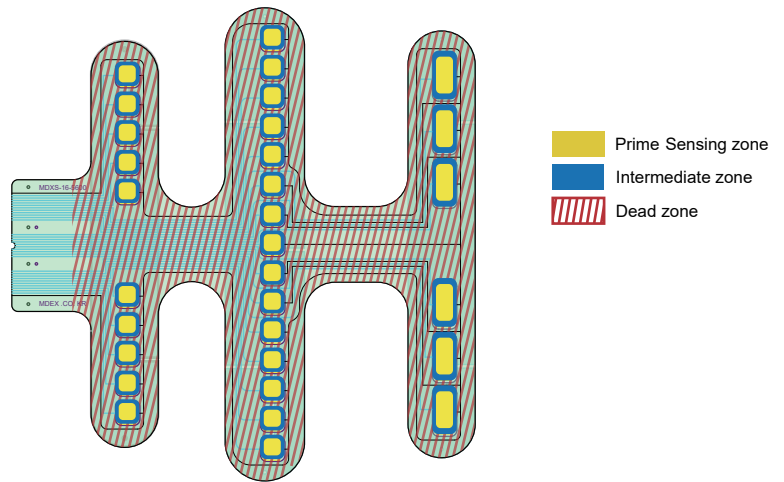
MDXS-16-5610

Unit	Description
Length	388mm
Width	380mm
Thickness	0.95mm
Sensing range (Per cell)	5gf ~ 4Kgf
Number of cells	31 cells

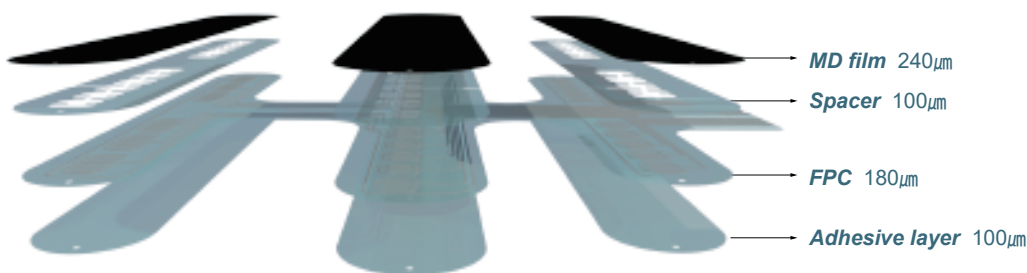
Sensor Mechanical Data(Scale : mm)



Sensing area(mm)

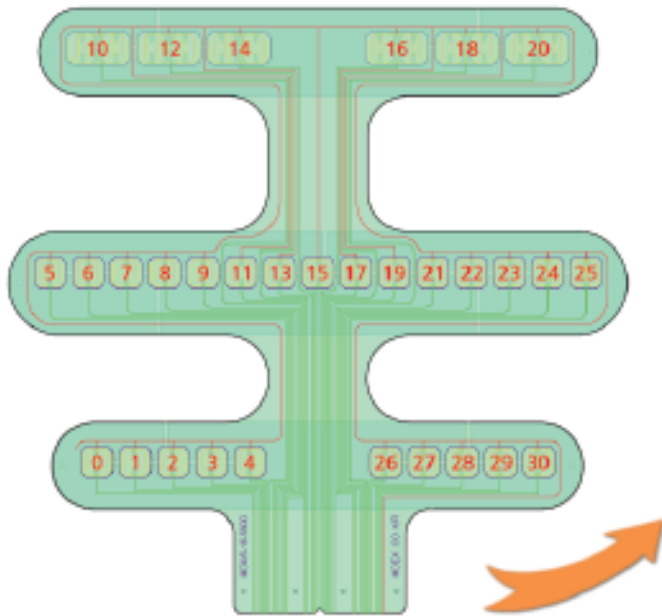


Exploded View

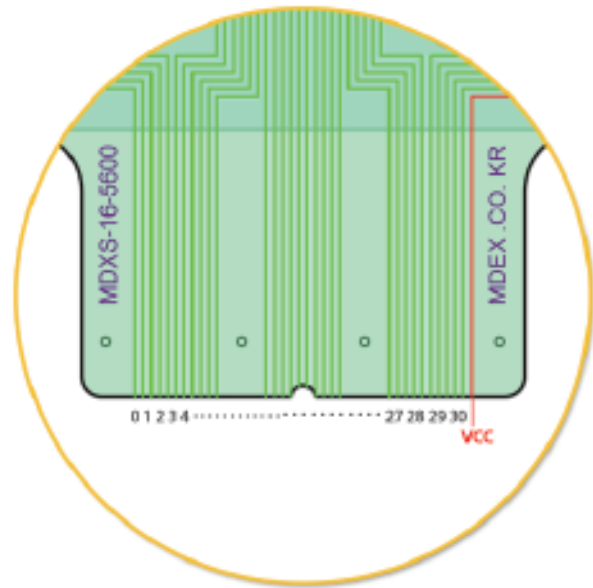


Model MDXS-16-5610

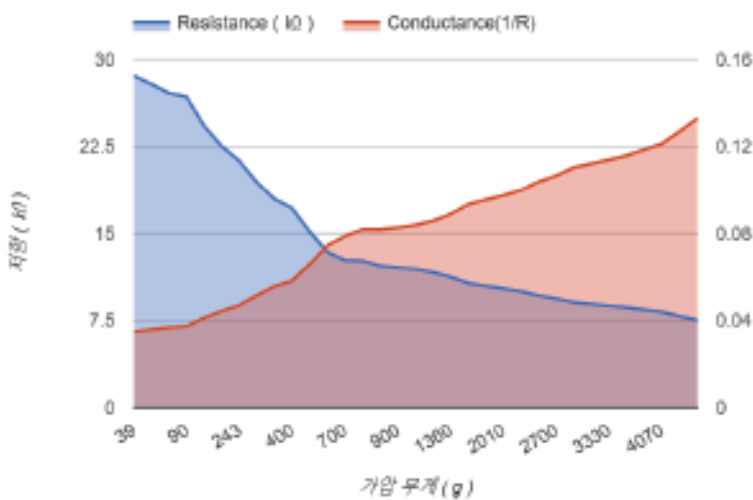
V-pad and A-pad on sensor substrate



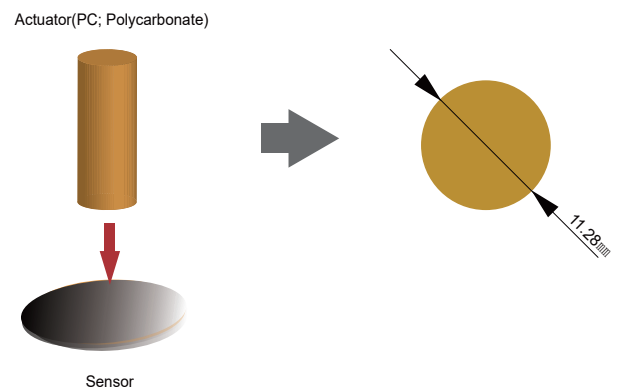
There are 31 terminals, separated by A0 ~ A30 and VCC as shown on the left. This pads match to the connector of Venus controller board.



Graph) Force to Resistance and Conductance



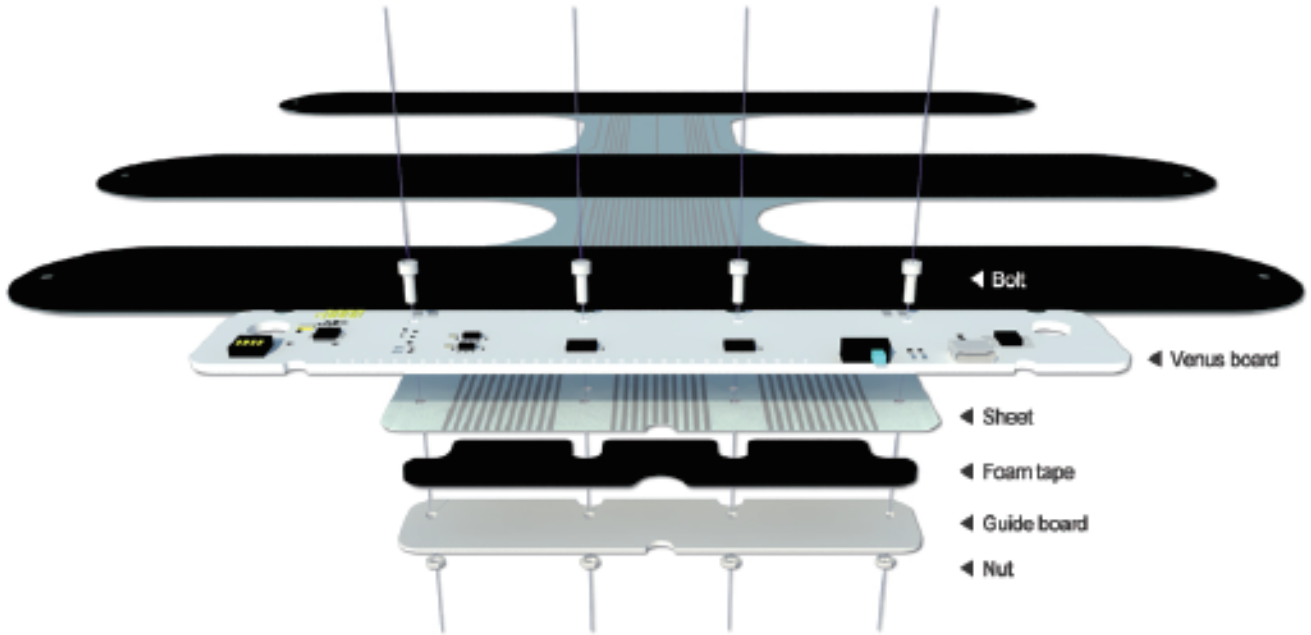
Actuator



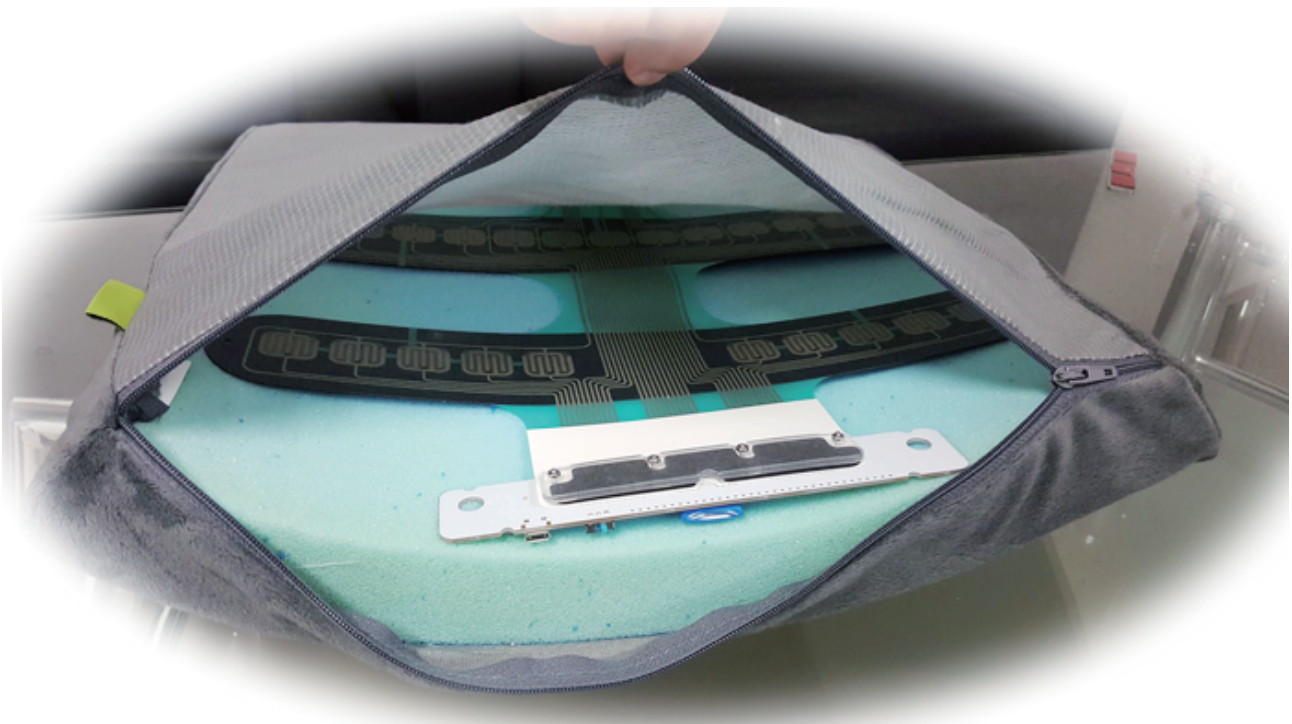
Sensing range is 5gf ~ 4Kgf per each cell while actuator is size of 3,23mm

Model MDXS-16-5610

How to connect wires(connect with Venus board)



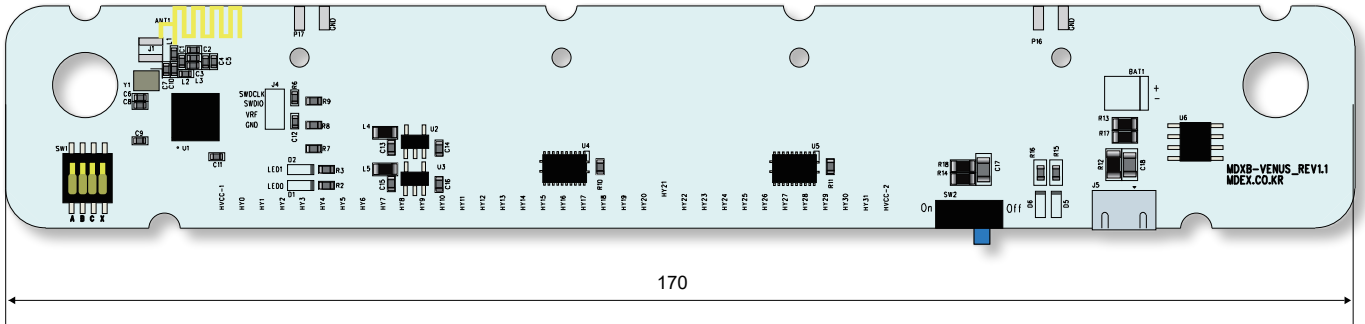
Sensor inside a cushion (Bottom side view. After closing the zipper, roll over the cushion to sit on)



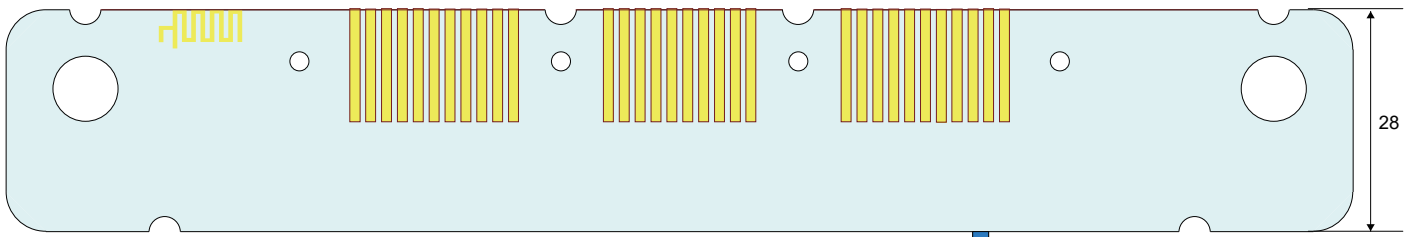
Model MDXS-16-5610

FSR measurement BLE board

Top(mm)



Bottom(mm)



product information

동작전압	1.8 to 3.6V
USB압력전압	DC 5V
디지털출력 핀	2EA(PWM 미지원, 진동 모터/ LED용)
아날로그 입력 핀	32EA
입/출력 핀당 DC 전류	40mA
외부 플래시 메모리	미장착
배터리 용량	기본 50mA(배터리 미장착시 동작하지 않음)
클럭속도	16MHz
블루투스 모듈	Bluetooth v4.0(BLE)
주파수	2.4GHz
데이터 전송 속도	40byte/ sec(저속) or 320byte/ sec(고속)
측정 해상도	7bit(0-127)
수신 감도	90dBm
가로 x 세로	170mm x 28mm
무게	-
블루투스 연결 방식	Peripheral모드, Advertisement 모드 (딤스위치 A로 선택=>OFF:Peripheral(기본), ON:Advertisement)
제조/ 원산지	한국

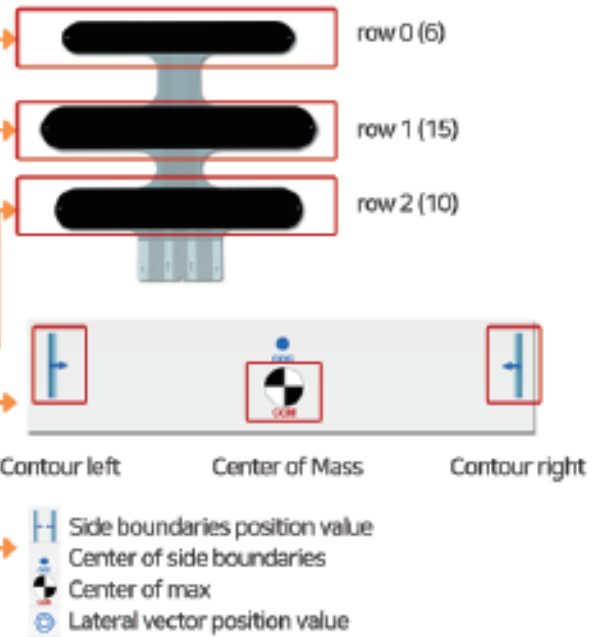

 All OFF
(Basic setting)

 'A' ON
A: BLE Serial Data Mode while OFF,
BLE Advertise Mode while ON

 'B' ON
B: 32-channel Measurement Standard Mode while OFF,
Cushion Sensor Compensation Mode while ON

Model MDXS-16-5610

Cushion app UI Description



Display of seating status and elapsed time

'Save to CSV' button
 'Save to CSV' button creates the excel file.
 Save all the measured values until you press the end button.



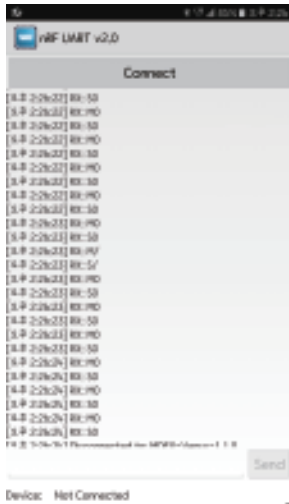
Date, Time	Cell index	Sensor output value
20170429_150408	0,0	100,0
20170429_150409	0,0	80,0
20170429_150409	0,0	40,0
20170429_150409	0,0	30,0
20170429_150409	0,0	80,0
20170429_150410	0,0	80,0
20170429_150410	0,0	75,0
20170429_150410	0,0	50,0
20170429_150410	0,0	4,0
20170429_150411	0,0	34,0
20170429_150411	0,0	31,0
20170429_150411	0,0	34,0
20170429_150411	0,0	64,0
20170429_150411	0,0	70,0

Model MDXS-16-5610

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Model MDXS-16-5610

Compatible software installation / build information



nrf Uart



<https://play.google.com/store/apps/details?id=no.nordicsemi.android.mcp>

<https://github.com/NordicSemiconductor/Android-nRF-UART>



MDEX_VENUS_1.1a

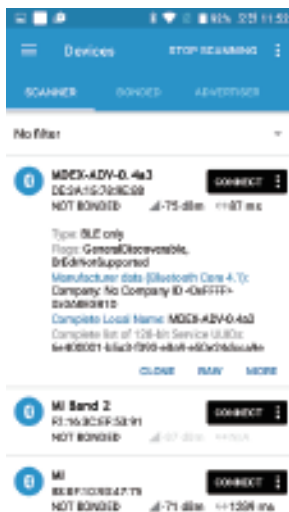


<https://play.google.com/store/apps/details?id=com.marveldex.seat31>

https://github.com/Marveldex/MDEX_SEAT_31a1

※ Precautions

If the screen of the application is turned off, the Bluetooth connection may be disconnected. VenusBoard does not save the measurement data, so please set the option so that the smartphone screen does not turn off.



Applications for receiving advertisement mode packets (While DIP switch 'A' is on)



<https://play.google.com/store/apps/details?id=no.nordicsemi.android.mcp>

<https://appsto.re/kr/J5e2-.i>

[Explanation example]

- 0x0A 0E 3B 1D => hex
- 0x0A: Fixed value (10 in decimal)
- 0x0E: digit of measurement value 100 (14 in decimal, that is, 1400)
- 0x3B: digit of measurement value 1 (59 in decimal)
- 0x1D: Number of valid cells

That is, the sum of the values measured in five sensor cells is $14 \times 100 + 59 = 1459$.
 (Note: Do not change 0x0E3B to decimal, it will replace 0x0E and 0x3B with decimal numbers respectively. If you change 0x0E3B to decimal, it becomes 3643. This is the wrong conversion.)