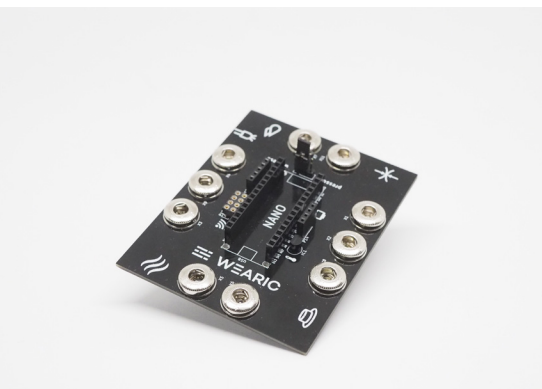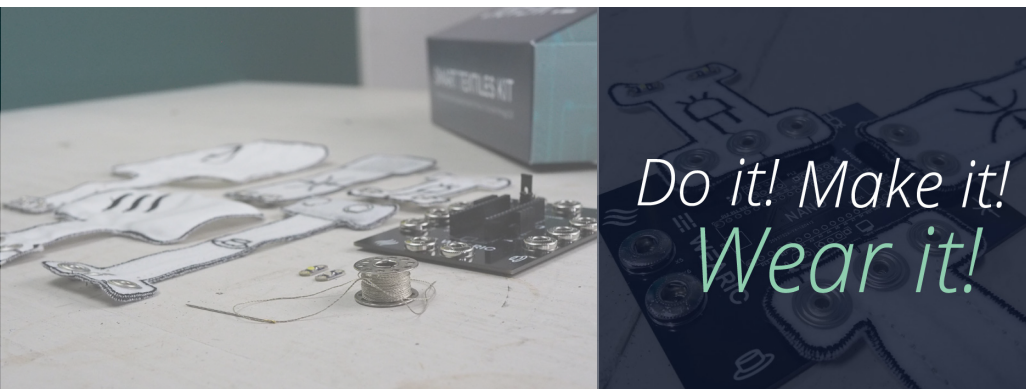# WEARIC

WEARIC - EXPANSION BOARD DATASHEET

PRODUCT DESCRIPTION
Interested in making your own smart textiles? The "Wearic - Smart Textiles KIT" is the world's first do it yourself package with textile sensors. Plug and play - a Nano microcontroller connected with the wearic expansion board and textile sensors. It was never so easy to make your own innovative sensor textile and wear it. From heated cloth to weight measurement in chairs, there are no limits to your creativity and your projects - Do it!

Do it! Make it! Wear it!

PRODUCT COMPATIBILITY
The Wearic Expansion Board is compatible with a Nano V3.0 Atmel Atmega328 microcontroller. Using 15mm snaps you can connect all Wearic Sensors, or your own sensor textiles, easily with the Nano controller. The expansion board converts the sensor signal for the controller and you can focus on programming your application.
Following sensors are compatibel with the WEARIC Expansion board and available in our Online-Shop:
- WEARIC LED textile
- WEARIC textile pressure sensor
- WEARIC textile pushbutton double
- WEARIC textile heating
- WEARIC textile wetness sensor

TECHNICAL DETAILS: EXPANSION BOARD

Size	90 x 70mm
Connectors	10 Snaps (15mm s-spring)
Analog Input	1 (Pressure, Wetness)
Analog Output	1 PWM (Heat)
Digital Input	2 (Push Button)
Digital Output	2 (LED)
Voltage Supply	5V DC
Max. Current	600 mA DC
Extensions	Display, Bluetooth
Additional Sensors on the PCB	Temperature

CIRCUIT DIAGRAM
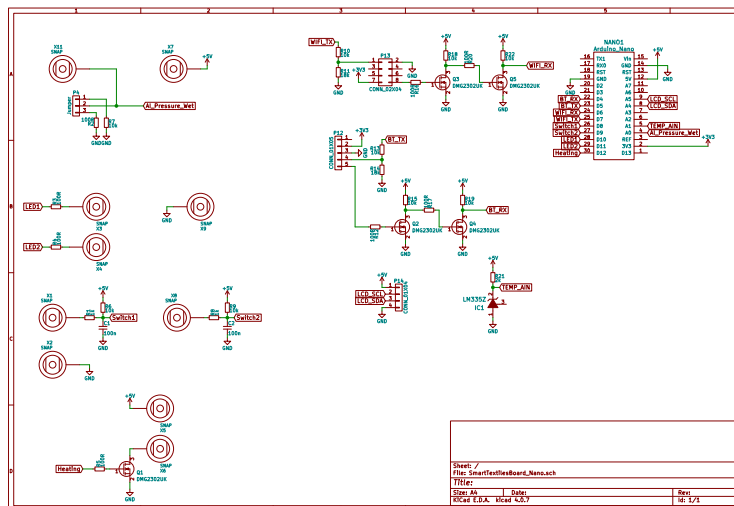
DOWNLOADS
More informations, datasheets, PCB Layout, circuit diagrams, etc. you can find them in our download section on www.wearic.com

WEARIC

WEARIC - LED TEXTILE DATASHEET

PRODUCT DESCRIPTION
The WEARIC LED textile is a conductive fabric with two sewable LED moduls or a LED sequins on it. The polyester fabric together with the conductive yarn builds a supply line. You sew the LED´s onto the farbic and connect 3 to 6 VDC to it or you use the WEARIC expansion board to get unlimited possibilities. Depending how you power the LED´s you also can switch more than one in paralell or in series. Shineing, fading, blincing, diffrent colours, everything is possible - Do it!


Do it! Make it! Wear it!
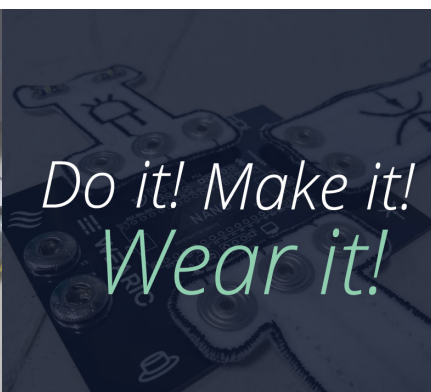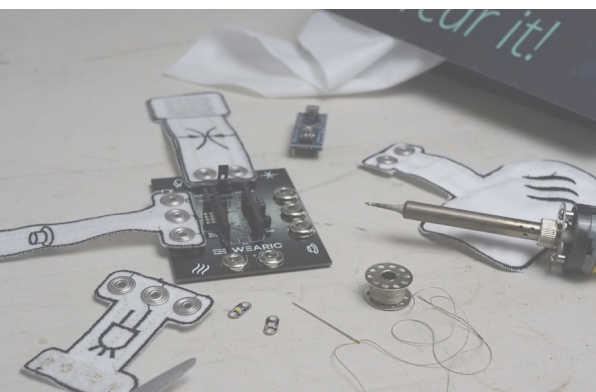
APPLICATIONS
wearables, information device, smart home, intelligent workwear

TECHNICAL DETAILS EXPANSION BOARD

Size	72 x 52mm
Connectors	3 Snaps (15mm s-spring)
Digital Output	2 (LED)
Voltage Supply	5V DC
Max. Current	50 mA DC
Textile Material	Polyester, Silver
Protective Circuit	serial resistance
Calculation serial resistance	$R_v = \dfrac{(U_{ges} - U_d)}{I}$
Washability	limited washability

CIRCUIT DIAGRAM
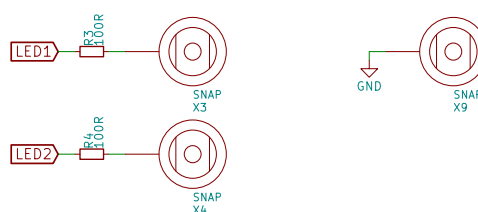
LED CHIP INFORMATION

Type	Luckylight S150 SMD LED (blue/white)	Reverse Voltage	5V
Typical Forward Voltage	3,4V	Typical Luminous Intensity	45mcd
Continous Forward Current	25mA	Viewing Angel	120 Degree

SAFETY INFORMATION
Do not use the LED textile without a serial resistance, otherwise LED´s can be destroyed.

DOWNLOADS
More informations, datasheets, PCB Layout, circuit diagrams, etc. you can find them in our download section on www.wearic.com

WEARIC - TEXTILE PRESSURE SENSOR DATASHEET

PRODUCT DESCRIPTION

The WEARIC textile pressure sensor is a very thin and breathable conductive circuite which can be easily integrated into every application. The sensor changes the electrical resistance when a force is applied onto the sensor. The conductive and pressure sensitive material in the middle of the sensor is very flexible and perfect for wearables and smart textiles applications. With 15mm press fasteners it is possible to connect your electronics fast and easy with the sensor. You only connect a Voltage divider between the sensor and the µC or you use the WEARIC expansion board to get unlimited possibilities - Do it!
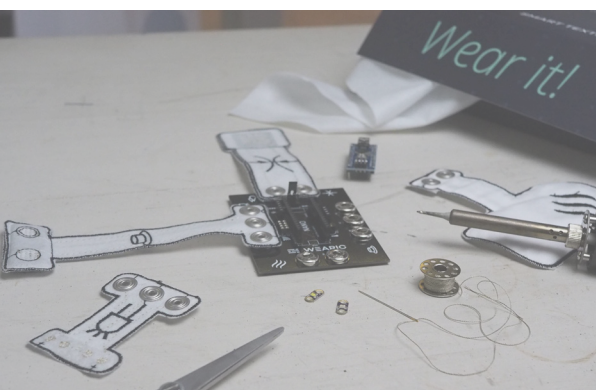
APPLICATIONS

wearables, smart home, intelligent workwear, occupancy detection, weight measurement, robotics, shoes, wearables, chair, games

TECHNICAL DETAILS EXPANSION BOARD

Size	123 x 48mm
Thickness	1,25mm
Connectors	2 Snaps (15mm s-spring)
Sensing Area	27 x 27mm
Resitance Range	10 - 2.000Ω
Force Range	5 - 200N
Textile Material	Polyester, Silver Yarn, Piezoresistive fabric
Measurment Circuit	voltage devider
Washability	limited washability

COMPATIBILITY WEARIC EXPANSION BOARD

|	
Value ADU	0 - 1023
Jumper	P4: left position
Resistance voltage divider (Rx)	100Ω
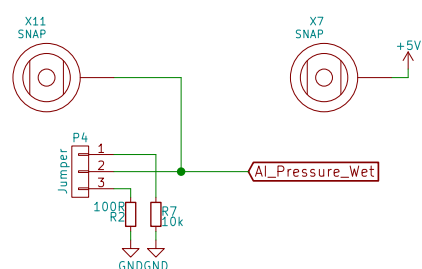
CIRCUIT DIAGRAM

Calculation voltage divider:

$$U_x = \frac{(U_g \cdot R_x)}{(R_1 + R_x)}$$

CHARACTERISTIC CURVE

The graph below illustrates how resistance changes when a force is applied to roughly asses the characteristics of the sensor. Note: the graph shows a force which is applied with a stamp of 1cm².

Textile Pressure/Force Sensitive Sensor
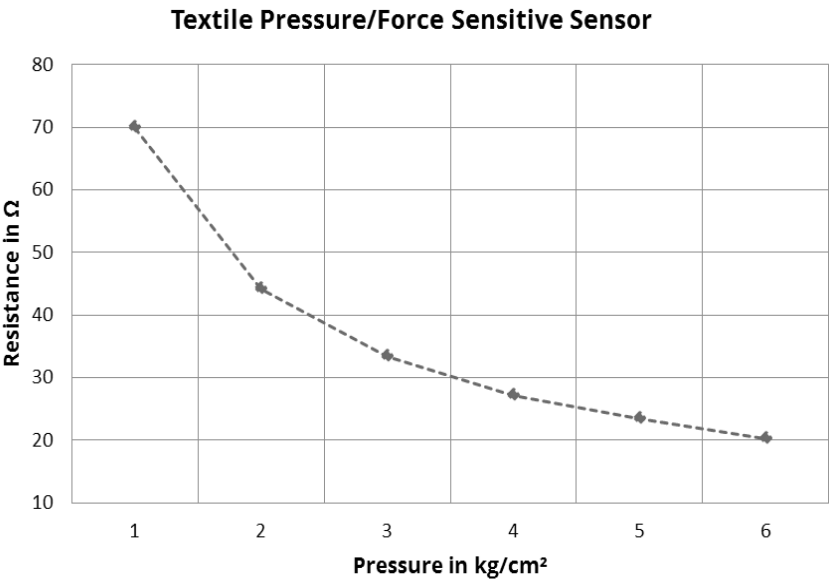
SAFETY INFORMATION

Do not power the pressure sensor with more than 5V, otherwise the sensor can become too hot and get destroyed.

DOWNLOADS

More informations, datasheets, PCB Layout, circuit diagrams, etc. you can find them in our download section on www.wearic.com

USED MATERIALS

You want to build your individual Smart Textile sensor? You need the following materials which are easily accesible in our Online-Shop:

| Item	Item Nr.
Polyester non woven	WRC101
WEARIC - Piezoresistive fabric	WRC102
WEARIC - Silver Yarn	WRC021
15mm snap incl. tooling	WRC024

WEARIC

WEARIC - TEXTILE WETNESS SENSOR DATASHEET

PRODUCT DESCRIPTION

The WEARIC textile wetness sensor detects small amounts of water or other liquids and ice on a substrate. The sensor textile is a very thin and breathable conductive circuite which can be easily integrated into every application. The sensor changes the electrical resistance when a liquid is applied on the sensor. A big advantage of this textile sensor is that the fabric absorbs and spread liquids very good and the conductive material in the middle of the sensor is very flexible - perfect for wearables and smart textiles applications. With 15mm press fasteners it is possible to connect your electronics fast and easy with the sensor. You only have to connect a a voltage divider between the sensor and the µC or you use the WEARIC expansion board to get unlimited possibilities - Do it!
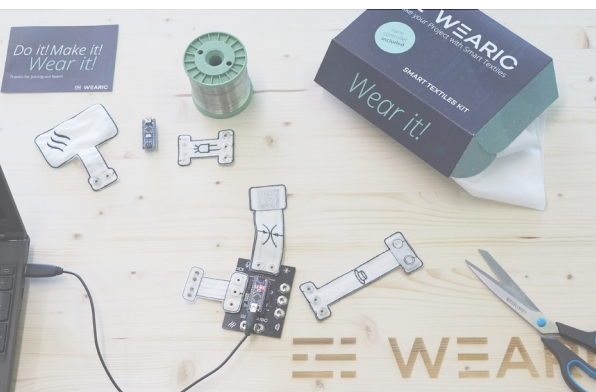
APPLICATIONS

wearables, smart home, plants, leakage, bed, baby, chair, games

TECHNICAL DETAILS EXPANSION BOARD

Size	180 x 90mm
Thickness	1,25mm
Connectors	2 Snaps (15mm s-spring)
Sensing Area	100 x 100mm
Resitance Range	1k - 1MΩ
Liquid amount	0,5 - 10ml
Textile Material	Cotton, Stainless steel yarn
Measurment Circuit	voltage devider
Washability	limited washability

COMPATIBILITY WEARIC EXPANSION BOARD

|	
Value ADU	0 - 1023
Jumper	P4: right position
Resistance voltage divider (Rx)	10kΩ
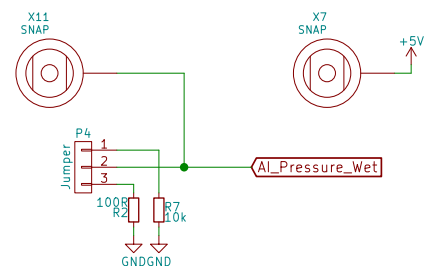
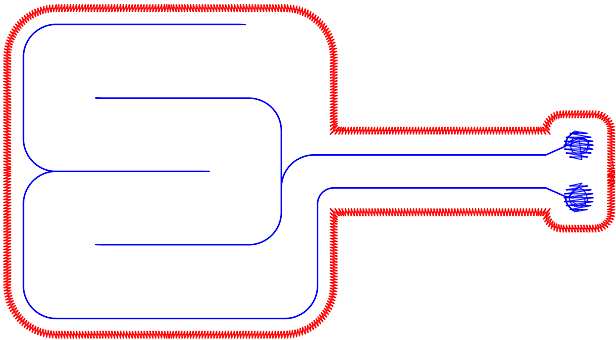## CIRCUIT DIAGRAM

Calculation voltage divider:

$$U_x = \frac{(U_g \cdot R_x)}{(R_1 + R_x)}$$

CHARACTERISTIC CURVE

The graph below illustrates how resistance changes when water is applied on the sensor to roughly asses the characteristics of the sensor. Note: the sensor behaves different to salt concentration in liquids. The higher the salt concentration - the lower the resistance.
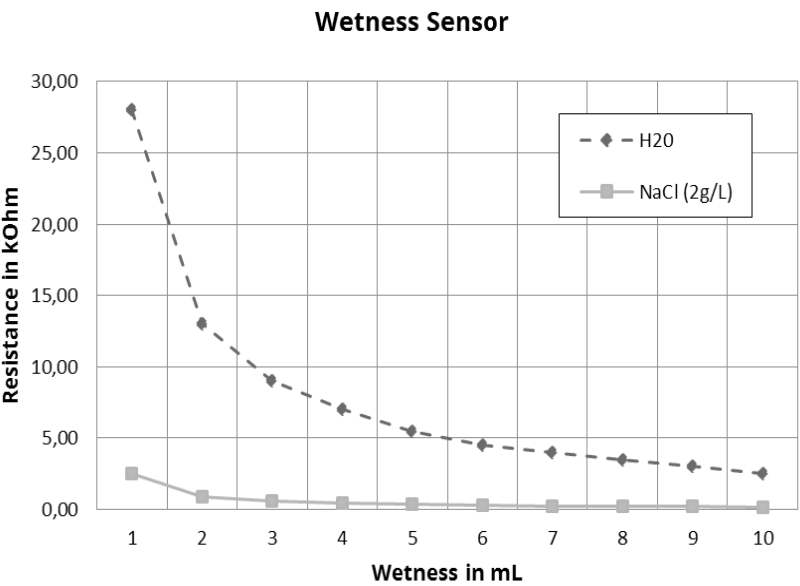
SENSOR SCHEME

DOWNLOADS

More informations, datasheets, PCB Layout, circuit diagrams, etc. you can find them in our download section on www.wearic.com

USED MATERIALS

You want to build your individual Smart Textile sensor? You need the following materials which are easily accesible in our Online-Shop:

Item	Item Nr.
Cotton fabric	WRC103
Stainless Steel Yarn	WRC023
15mm snap incl. tooling	WRC024

WEARIC

WEARIC - TEXTILE HEATING ELEMENT DATASHEET

PRODUCT DESCRIPTION

The WEARIC textile heating element is the perfect wearable heating element. Stainless steel fibers between two cotton fabrics build the a breathable system which is ideal for wearable heating systems. Connect 5V to the snaps and the textile will heat up immediatly. The highest temperature which can be reached depends on the application enviroment.

The heating element is very thin and breathable. It can be easily integrated into every application. With 15mm press fasteners it is possible to connect your electronics fast and easy with the heating element. You only have to connect a PWM-Controller and a temperature sensor between the heating element and the µC or you just easily use the WEARIC expansion board to get unlimited possibilities - Do it!


Do it! Make it! Wear it!

APPLICATIONS

wearables, smart home, bed, baby; chair, games, socks, high temperature heating

TECHNICAL DETAILS EXPANSION BOARD

|	
Size	160 x 90mm
Thickness	1,25mm
Connectors	2 Snaps (15mm s-spring)
Heating Area	90 x 60mm
Resitance	10Ω
Maximum Voltage	5V
Maximum Power	2,5W
Textile Material	Cotton, Stainless Steel & Silver Yarn
Electronic Circuit	PWM-Controller, transistor
Washability	limited washability
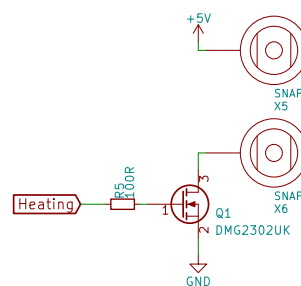
COMPATIBILITY WEARIC EXPANSION BOARD

Value ADU	0 - 255		Voltage	5V
Base Resistance Transistor	100Ω		app. Temp. difference	17K
Current	0,5A			

CIRCUIT DIAGRAM
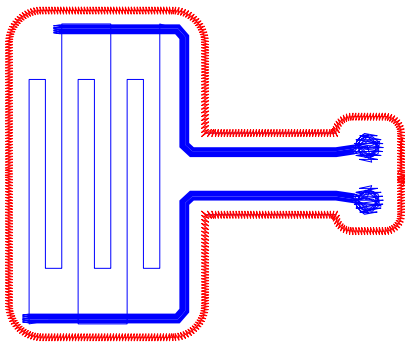
CHARACTERISTIC CURVE

The graph below illustrates how temperature changes during time when 5V are applied on the heating element. Note: the heating element can be regulated continously with a PWM-Controller and a temperature sensor.

Textile Heating Element

VDD = 5V
I = 500mA
ΔT= ca. 17K
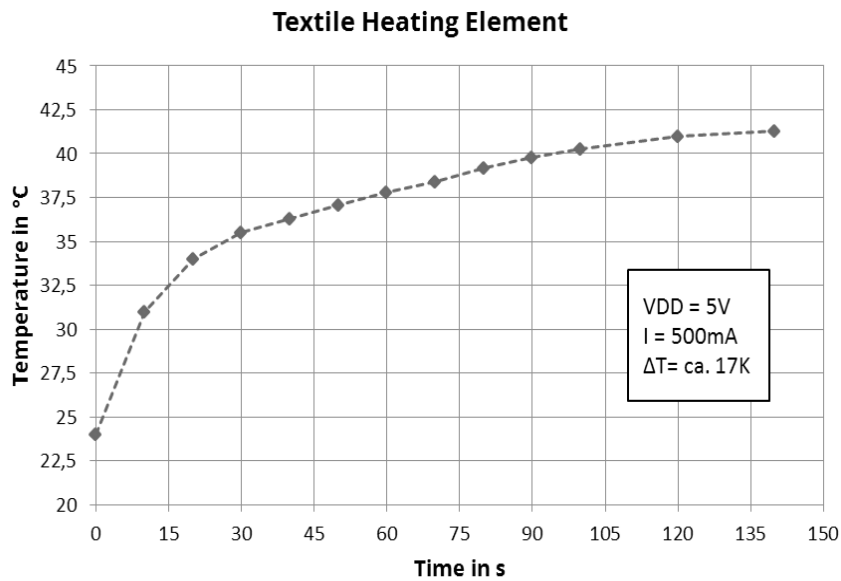
HEATING TEXTILE SCHEME

SAFETY INFORMATION

Only use the WEARIC Expansion Board together with the WEARIC textile heating element. Furthermore it is only allowed to supply the textile heating element with a maximum of 5V. Otherwise the textile can overheat.

DOWNLOADS

More informations, datasheets, PCB Layout, circuit diagrams, etc. you can find them in our download section on www.wearic.com

USED MATERIALS

You want to build your individual Smart Textile sensor? You need the following materials which are easily accesible in our Online-Shop:

| Item	Item Nr.
Cotton fabric	WRC103
Silver Yarn	WRC021
Stainless Steel Yarn	WRC023
15mm snap incl. tooling	WRC024

WEARIC - TEXTILE PUSH BUTTON

PRODUCT DESCRIPTION

The WEARIC textile push buttons are perfect to switch your project ON or OFF. LED´s, heating, motors, everything has to be turned on or adjusted. The textile push button is a conductive, soft, breathable textile solution which is easy to integrate into your wearable. The polyester fabric together with the conductive yarn builds a supply line for the two channel normally open push button. Use the WEARIC expansion board to debounce the textile push button and get unlimited possibilities. Everything is possible - Do it!
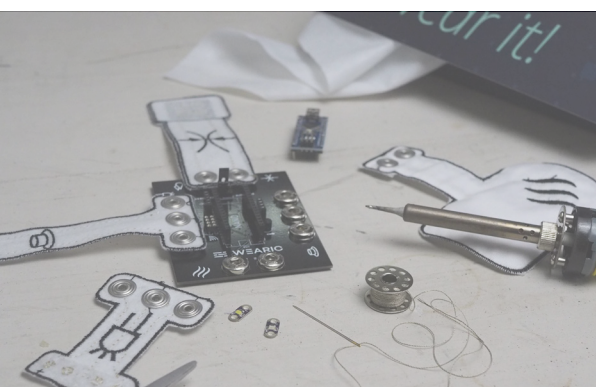

APPLICATIONS

wearables, information device, smart home, intelligent workwear, occupation

TECHNICAL DETAILS EXPANSION BOARD

Size	120 x 50mm
Connectors	3 Snaps (15mm s-spring)
Digital Input	2 (Push Button)
Voltage Supply	5V DC
Max. Current	100 mA DC
Textile Material	Polyester, Silver Yarn
Debounce Circuit	low pass
Calculation low pass	$U_a = \dfrac{U_e}{\sqrt{(1 + (\omega CR)^2)}}$
Washability	limited washability
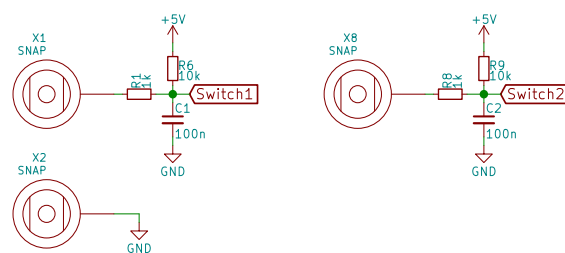
CIRCUIT DIAGRAM

SAFETY INFORMATION

Do not use higher current than 100mA DC and voltage over 5V.

DOWNLOADS

More informations, datasheets, PCB Layout, circuit diagrams, etc. you can find them in our download section on www.wearic.com

USED MATERIALS

You want to build your individual Smart Textile sensor? You need the following materials which are easily accesible in our Online-Shop:

Item	Item Nr.
Cotton fabric	WRC103
Silver Yarn	WRC021
15mm snap incl. tooling	WRC024