QUICK REFERENCE · TK65

Steam Sensor

Water on the gold loops raises SIGNAL from 0 V towards VCC. Analog, not HIGH or LOW.

VCC is your board's logic voltage

Soaked loops put VCC itself on SIGNAL. **On an ESP32, ESP32-S3 or Pico wire VCC to 3V3**: 5 V there can put 5 V on a 3.3 V analog pin. Only an Uno takes 5V.

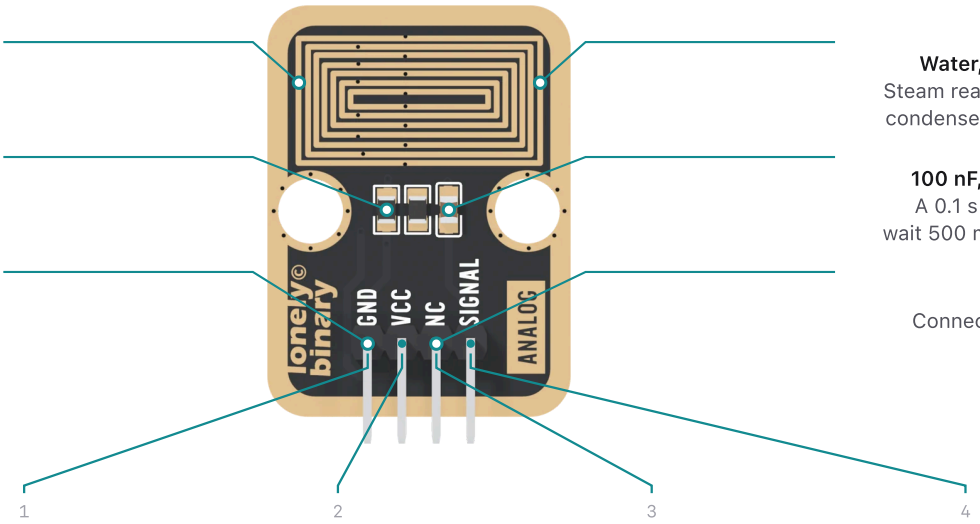
Pins, and which to wire

Loops up, header at the bottom. Wire GND, VCC and SIGNAL; NC is connected to nothing on the board. Read SIGNAL on an analog pin.

7 loops of bare gold
Every other one on VCC. Water across a gap reads.

1 MΩ to GND
Holds SIGNAL at 0 V while the loops are dry.

GND is the square pad
Count from it. The back prints no pin names.



Water, not humid air
Steam reads only once it condenses on the loops.

100 nF, behind 150 Ω
A 0.1 s time constant: wait 500 ms after power.

NC
Connected to nothing on the board.

Front	GND	VCC	NC	SIGNAL
Read it	GND	VCC	●	SIGNAL

It reads water, not humidity

Water vapour is a gas and conducts nothing, so humid air reads 0. Steam and breath register when they condense into droplets on a board cooler than they are; a drop left behind keeps reading until it dries.

What SIGNAL does

Dry

0 V

The 1 MΩ holds it down. The block draws no current at all.

Water of 1 MΩ

½ of VCC

The water and the 1 MΩ share VCC. About 512 of 1023 on an Uno.

Soaked

VCC nearly

Water far below 1 MΩ. At most 3.3 µA from 3.3 V.

SIGNAL = VCC × 1 MΩ / (1 MΩ + the water). How far it rises depends on how much water and how much is dissolved in it, so set wet and dry from readings on your own board.

Arithmetic on the net list and the Gerber, not measured. The pattern is 7 loops, 0.4 mm wide, 0.2 to 0.35 mm apart. Powered from a pin, the worst first moment is 22 mA for about 15 µs. The sketch compiles for an ESP32-S3 and an Uno; the block has not been bench-tested for this sheet.

Wet or dry, on an ESP32-S3

Arduino IDE · Board: ESP32S3 Dev Module · USB CDC On Boot: Enabled · No library

```
// SIGNAL: Uno A0. ESP32 34. S3 4. Pico 26.
// VCC from: Uno 7. ESP32 25. S3 5. Pico 15.
const int STEAM_PIN = 4, POWER_PIN = 5;

#if defined(ARDUINO_ARCH_ESP32)
const int FULL = 4095;
#else
const int FULL = 1023;
#endif
const int WET_AT = FULL * 30 / 100;   // wet above 30 %
const int DRY_AT = FULL * 10 / 100;   // dry below 10 %
bool wet = false;

void setup() {
  Serial.begin(115200);
  pinMode(POWER_PIN, OUTPUT);
}

void loop() {
  digitalWrite(POWER_PIN, HIGH);
  delay(500);                    // five 0.1 s time constants
  int reading = analogRead(STEAM_PIN);
  digitalWrite(POWER_PIN, LOW);

  Serial.println(reading);
  if (!wet && reading > WET_AT) {
    wet = true;
    Serial.println("wet");
  } else if (wet && reading < DRY_AT) {
    wet = false;
    Serial.println("dry");
  }
  delay(9500);                   // one reading every 10 s
}
```

```
0
...
wet
...
dry
```

Serial Monitor at 115200: a reading every 10 s, and wet or dry only when that changes. How high a wet reading goes depends on your board and the water.

Wiring

	FRONT	S3	UNO	ESP32	PICO
1	GND	GND	GND	GND	GND
2	VCC	3V3	5V	3V3	3V3
3	NC				
4	SIGNAL	GPIO 4	A0	GPIO 34	GP26

Hole 1 is the square pad. VCC is each board's logic voltage, or, for the sketch above, a pin driven only while reading: GPIO 5 (S3), D7 (Uno), GPIO 25 (ESP32), GP15 (Pico). SIGNAL goes to an analog pin; the ESP32 pins are on ADC1.

Power it only to read

DC through water slowly eats the positive loop. The 1 MΩ keeps the current to microamps, and switching VCC from a pin keeps it to half a second in ten. The 100 nF then starts empty: read 500 ms after switching on, not a few milliseconds.

When it does not work

0 even when wet

VCC is missing, or a pin-powered VCC is not driven HIGH first. Count from the square pad.

Will not come back to 0

A drop or a film of grime still bridges a gap. Rinse with isopropyl alcohol and dry.

Steam nearby, reads 0

It has not condensed on the board. Put the loops in the steam's path.

Wanders with the board dry

SIGNAL is not on the pin read, or GND is off. Check STEAM_PIN and NC.

Pinned at full scale

Soaked with conductive water, or VCC on 5V beside a 3.3 V board.

Lower when pin-powered

The 100 nF is still filling. Wait 500 ms before analogRead.

Specifications

Sensor	7 bare gold loops, 0.4 mm	**Gaps**	0.2 to 0.35 mm, VCC to SENSE
Reads	Water on its surface, not humidity	**SIGNAL**	Analog, 0 V dry, up to VCC
Divider	Water over 1 MΩ to GND	**Filter**	150 Ω, 100 nF, 0.1 s
Current	0 dry; at most 3.3 µA at 3.3 V	**Supply**	Your board's logic voltage