Design Summery :

Aim : Design A system Using Humidity sensor.

HPP 805 A 031 .

⇒ Objective : 1) An exhust fan need to "turn on" when the Relative humidity is Less than 30% .

2) If humidity falls too low it means more ventilation is required, so a fan needs to be turned on. fan (230V, 50Hz)

★ As we are using HPP805A031 Humidity sensor, which has 5V dc supply.
And we are assuming we have 230V AC supply
So, we need a Power system block which can give 5V DC .

- **Power System Block :**

- As we have 230V AC, & we need 5V dc as input to the sensor.
1st we need to step-down to 12V with a Transformer then, through rectifier we can convert it to dc nearly 10V .

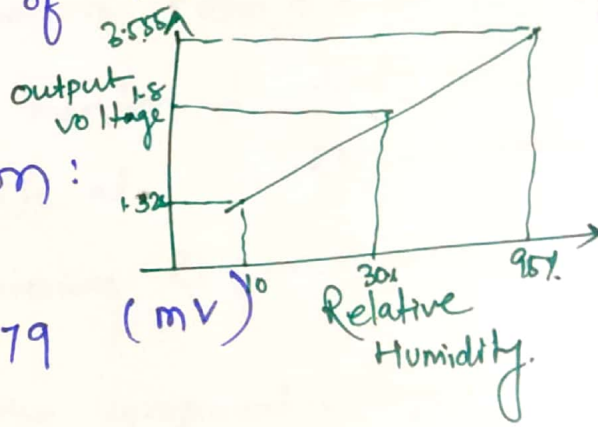
- To maintain the DC voltage we need a dc link capacitive filter.
- we can connect A Red Led to check the power supply is by a resistor to limit the current.
- LM7805, Regulator is used to give 5V, dc. for the input to sensor.
- There we can usee one high freqeuncy unpolariseed capacitor to absorb / pass the high freqeuncy compnet present in the circuit
- One Green LED is connected to see the validation of 5V, dc supply.

HPP805A031 Humidity Sensor :

- This is a relative Humidity transducer (RH transducer). which will give the output voltage change with a change in humidity.

- Internal Description is HM1500 Lf.

As HM1500 Lf is speified for Accurate measurment within 10% to 95% RH. with a voltage measument of 1.325 V to 3.555 V respectively.



Based on the Linear relation:

$$V_{out} = 25.68\,RH + 1079$$

(RH in percentage).

- As my objective is to turn on ① Exhust fan and room fan at 30% & 10% RH, One comparator (op-amp) is used to compare the condition and give the signal accordingly.

- Here for first condition : Turn on Exhust fan at 30% RH.

So we can Give the comparator input— inverting(-)terminal from sensor output, and non-inverting(+)terminal to Reference voltage 1.86V

So, when V_+ (noninverting) > V_- (inverting)

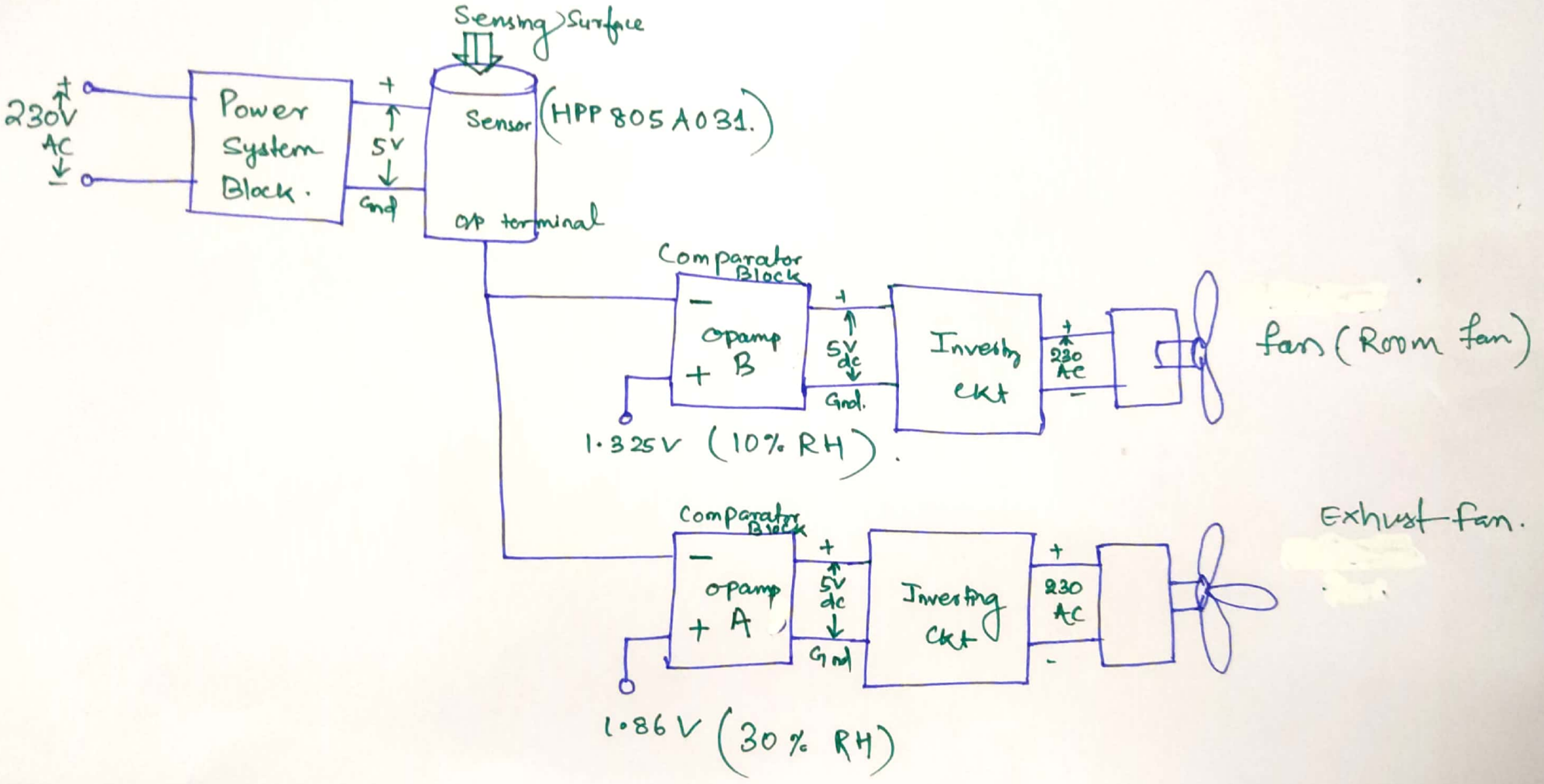
then the output will be $V_{cc}^+ \rightarrow$ 5 v dc. that can be given to Ac inverting circuit to make the Exhust fan turn on.

- for the 2nd Condition : Turn on Room fan at 10% RH in question Less humidity is mentioned but— the sensor give more accurate at 10% RH at minimum So, 10% RH is taken as minimum RH condition.

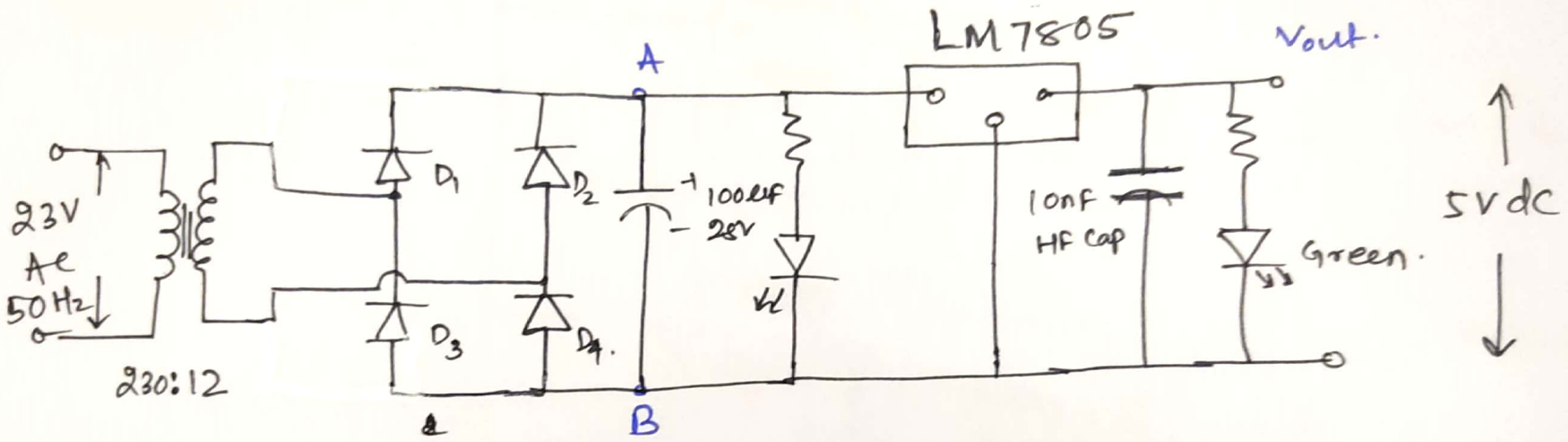
So, we can give the comparator input— inverting terminal from sensor output, and non-inverting terminal to Reference voltage of 1.325 V

so, when $V_+ > V_- \rightarrow$ o/p of opamp will go high $+V_{cc} \rightarrow$ 5 v dc & that can be given to Inverting ckt to make the fan turn on to control the humidity in Room.

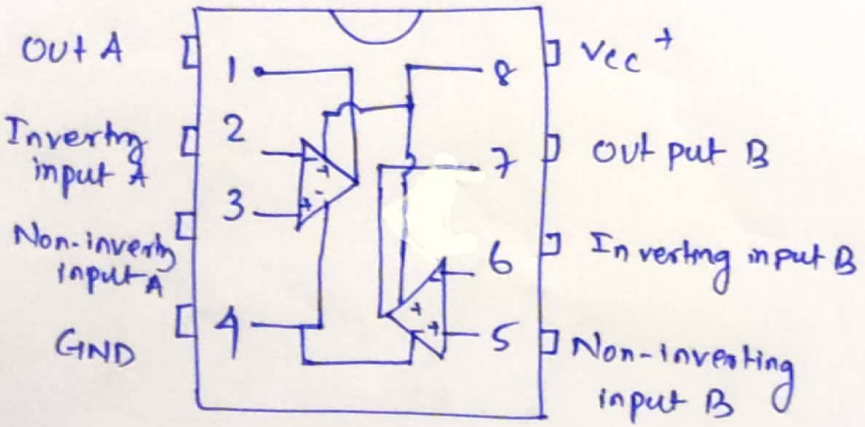
Block Diagram



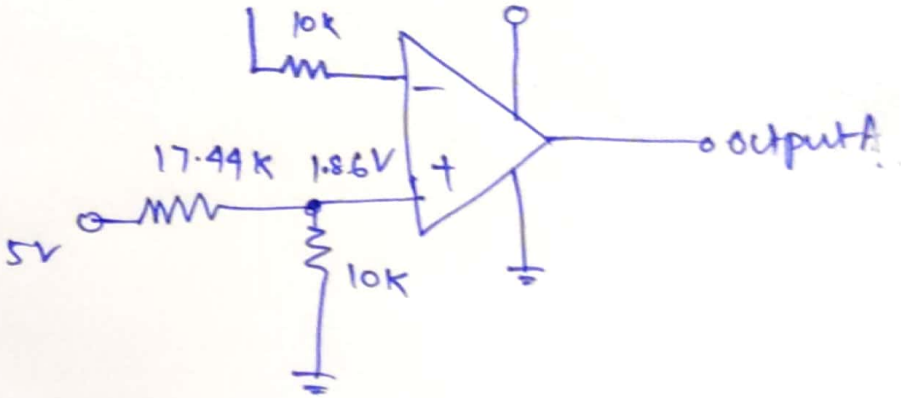
Power System Block (from 230 V AC – 5 V DC)



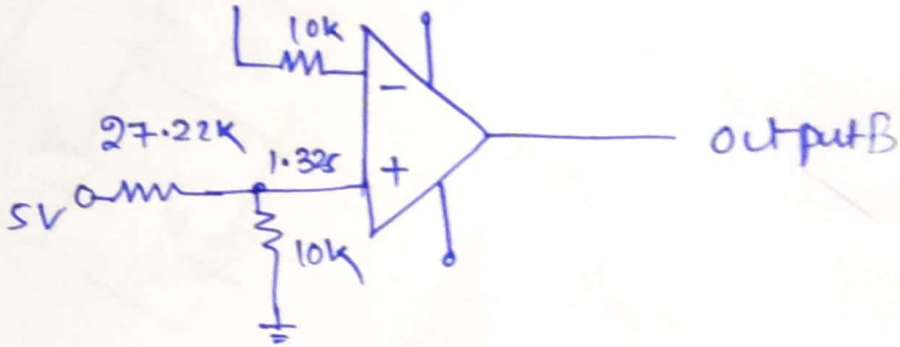
OP-AMP Design :



Opamp.A (30% RH Detector)



OP-amp-B (10% RH Detector)



Inverting Module