2. Ammonia Sensor: EC-4X-NH3 Sensor

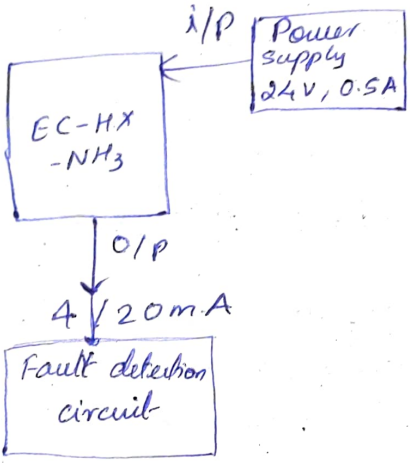
Given specifications in question: Alert when concentration >100ppm

For a range of 0-100ppm, 25 ppm is the default alarm level

Here we want alarm at 100ppm, we'll need 0-400ppm range

EC-4X-NH3 sensor specifications:

Range - 0-500ppm



Fault level <10 ppm
↓
0-5mA

Maximum input impedance of monitoring equipment = 700Ω

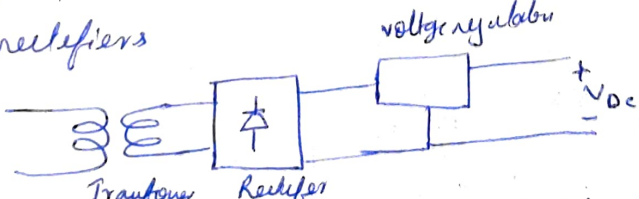
I	R	V
4mA	700Ω	2.8 (V_{min})
20mA	700Ω	14 (V_{max})

⇒

Requirements:

1) Power supply: An isolated DC power supply of rating 24V, 0.5A ⇒ P = 12W supply

- Implement using DC-DC converter: For DC-DC converter, we have certain disadvantages like they are prone to noise, duty cycle control, switching frequency
- Implement using transformers & voltage regulators and rectifiers



Use of transformers makes it bulkier and can lead to electromagnetic interference issues, makes it costly.

Solution:

Use an isolated AC-DC power supply module which converts 230V (AC) to 24V (DC). It is already available in market

HLK-20M24 ⇒ Isolated AC-DC power supply

Advantages: → Compact
→ Easier use
→ No external control
→ Less costly

2) Monitoring equipment / Fault detection circuit

Requirement → When atmospheric concentration ~~of~~ equal ammonia is equal to greater than 100ppm, then an alert should be sent

- The ~~the~~ available sensor is is a current sensor, therefore we need to either convert to voltage or current

current sensors are prone to offsets, negative & positive gains, defects in core of sensors etc. And so, it is easier to convert to voltage and then detect if the obtained voltage is corresponding to a fault concentration above 100ppm

Current to voltage converter

1) Transimpedance amplifier