

Plc Based Ac Gas Filling Machine

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Abstract- As demand for automobile is increased now a days. Many of the automobiles are now having the facilities of air conditioning which provides a pleasant environment to the people. As excess inhale of refrigerant gas could harm the people. This machine provides precise filling of refrigerant gas R134a in vehicle AC tank from the main supply tank, also provides safety interlocks for leakage of gas.

Keywords- AC (Air Conditioning), gas filling machine, Leakage testing, Evacuation, Charging Unit, Power pack.

I. INTRODUCTION

When it comes to fill large number of tanks at given interval of time then it comes to the performance of machine to fill the tank with provided parameters and the time span to fill the tank. Hence, this is a special purpose machine for filling of refrigerant gas from main tank to vehicle tank .this machine is provided with the safety features of leakage detection, safety interlocks. Also extra modes of working are provided for ease of controlling of machine by the worker. These kind of machine is based on application of electronics engineering ,mechanical engineering, instrumentation engineering, electrical engineering, which are together called as Mechatronics.

II. LITERATURE REVIEW

Study of the Automatic Vehicle Fueling System using Robotic Arm Controlled via PLC

Automatic vehicle fueling system is a system which utilizes a positioning robot arm that is allowed to move using its search head and extendable nozzle toward the fueling spot of the car. Distance sensor and weight sensor are used in the system to locate the actual location of the car and provide accurate fueling position. This system includes 'FASS' concept which are fast, accurate, safe and simple in order to allow car users having more friendly car fueling. The main focus of this project is to explore a new invention of fuel dispensing system which providing secure and reliability to car user, prevent human contact with potentially dangerous fumes, and reduce time usage in fueling up vehicle.

III. BLOCK DIAGRAM

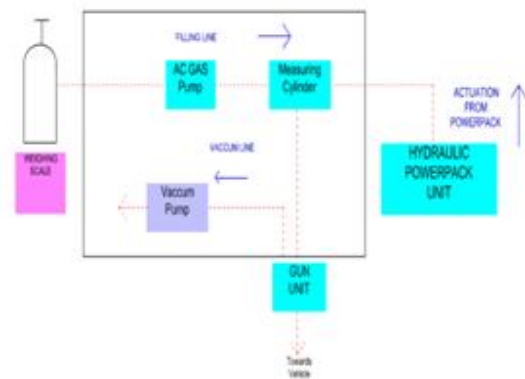


Fig.1 block diagram of ac gas filling process

IV. PROPOSED SYSTEM ARCHITECTURE

The main objective of AC gas filling machine is to provide a service of filling the tanks with efficient way with the desired time interval. The system architecture consist of weighing scale, ac gas pump, measuring cylinder, vacuum pump, gun unit, hydraulic power pack unit. Power supply and all the required electrical wiring is done at the machine itself. The purpose of the system is to evacuate the car A/c system to the preset vacuum level in preset time period and charging the fixed quantity (preset amount by Volume /weight) of A/C gas (refrigerant) into the mobile A/C system of the vehicle.

V.METHODOLOGY

This is the system for charging of liquefied refrigerant to the A/c system of vehicle. This equipment includes following systems:

- Supply system.
- Evacuation system.
- Charging system
- Electrical controls.
- Validation Chamber.

1. Evacuation system

Vacuum pump is provided for evacuating A/C system of vehicle. Vacuum tank is provided for vacuum storage and

vacuum sensor is provided for maintaining required vacuum level in the tank. Vacuum sensor is provided to measure the actual vacuum level in the machine.

2. Supply system

A suitable supply pump / booster pump will be used to transfer refrigerant from storage cylinder to measuring cum charging cylinder. It will ensure positive displacement of refrigerant from storage cylinder to “measuring cum charging cylinder” No gas / liquid should be left in storage cylinder. Supply system shall be able to utilize refrigerant in storage cylinder to max possible extent. Standard connector shall be used for connecting the existing R 134a cylinders. Standby A/C gas charging attachment shall be provided optionally. This will avoid Interruption in gas charging process if the storage cylinder gets empty during charging process. The system will switch the circuit from empty cylinder to full one automatically. The system will indicate the empty condition with lamp and sound.

3. Charging unit shall comprise

Flowmeter for measuring and pump for charging. Optionally we can use

A Measuring cylinder with an Operating system for measuring and charging.
Flow meter and pump: It comprises of pump and flow meter having necessary arrangements for accurate charging and measuring.

4. Optionally

Measuring Cylinder with Operating system for measuring and charging:

An operating system with a Measuring cylinder is used for measuring and charging. The operating system consists of hydraulic/ pneumatic / electronic system which shall be able to measure the quantity accurately & charge same into vehicle A/C system. This system ensures a positive displacement of refrigerant from the measuring / charging cylinders to vehicle A/C system.

5. Controls

PLC (Mitsubishi/ Allen Bradley/ Siemens / Eq make) based controller is provided to control the functions of equipment. Control panel is provided with necessary push buttons for auto/ manual mode.

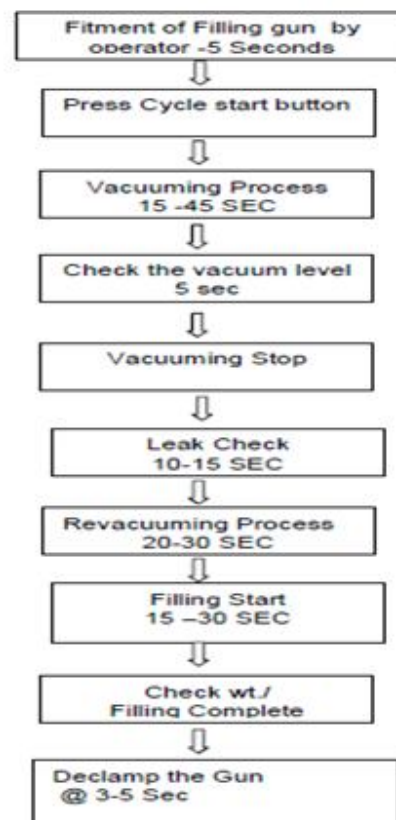
5. Weighting Machine & SCADA system:

Weighing machine required for measure the AC gas into the storage cylinder. It will include standard weighting scale with communication port of 100kg. SCADA system includes PC & NI based lab view system with data transfer facility. It gives graphical representation of system and data logging. It will continuously monitor the presence of AC gas into the storage cylinder. Weighting machine & SCADA system send the signal to PLC, If AC gas quantity into the storage cylinder falls below the 4kg then machine will not charge the system.

6. Barcode Scanner

Barcode scanner will be provided to scan the vehicle identification number before starting the test.

VI. FLOW CHART



VI. RESULT

Hence we have controlled the operation of AC Gas filling machine in minimum time with required safety parameters.

VII. ADVANTAGES

- Minimum cycle time.
- Provided safety interlocks.
- SCADA controlling available.

VII. CONCLUSION

The system provides the design which provides a platform on scada to have a interface with the system. Hence the system is available to deliver proper working of ac gas filling machine with precise accuracy and in feasible timing. Machine finds application in automobile industry.

VIII. ACKNOWLEDGEMENT

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REFERENCES

- [1] E. B. Richard, H. Dearborn, B. Bradford and A. Ann, "Automotive Vehicle Fueling System", United States Patent, 6032703, (2000).
- [2] G. Irwin, G. Morton, R. Eugene and H. Chicago, "Automatic Fueling System For Automobiles", United States Patent, 3642036, (1972).
- [3] M. Z. A Rashid and S. K. S Nordin, "Design and Control of Aquarium Water Management System using Programmable Logic Controller (PLC)", International Journal of Science and Research (IJSR), vol. 3, no. 9, (2014) September.
- [4] ARI. 1999. Statistical Profile of the Air-Conditioning, Refrigeration, and Heating Industry, 4301 North Fairfax Drive, Arlington, VA, USA, p. 28.
- [5] Sanjeev Gupta and S C Sharma "Selection and Application of advance control System: PLC, DCS and PC Based System" Journal of Scientific and Industrial research, April 2005, Vol.64, pp.249-225
- [6] Sadegh Vosough and Amir Vosough "PLC and its Applications" International Journal of Multidisciplinary Sciences and Engineering, November 2011, Vol.2, No.8.
- [7] John R. Hackworth and Frederick, D. Hackworth, Jr., Programmable Logic Controllers: Programming Methods and Applications.