

The new energy of commercial vehicle electric air drier

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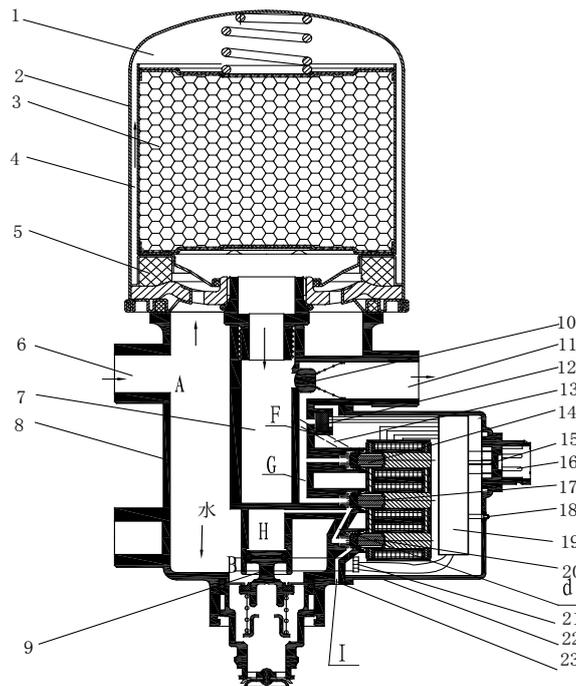
Abstract. As is known to all, a vehicle air brake system, in which usually contains moisture. To help solve the problem, it is common to use air dryer to dry compressed air effectively and completely remove the moisture of braking system. However, the existing air dryer can't suitable for all commercial vehicles. Base on the running status of new energy vehicles during the early stage, This research expounds the structure design principle of electric driven air dryer, respectively from the Construction and operating principle of the air dryer, Research and development process

Introduction

As is known to all, a vehicle air brake system, in which usually contains moisture. The moisture and oil will cause many problems such like the steel components of the braking system rustiness, the rubber sealing parts cracked, the pipeline blockage, and the valves no actuation, eventually, leading to the components of automobile braking system cannot guarantee their normal function during the service. To help solve the problem, it is common to use air dryer to dry compressed air effectively and completely remove the moisture and oil of braking system. However, the existing air dryer can't suitable for all commercial vehicles, such as bus, new energy hybrid vehicles and so on, the main problem is: the saturation of cartridge failed after a short time. Pressure changes of air dryer pressure regulating device causing air supply of vehicle is unstable. Air compressor cannot get stop-running signal during the unloading process of air dryer; In order to solve these problems, our company began to integrate the electronic products to control air dryer on the basis of the original pure mechanical type, which can be adapt to all commercial vehicles, meanwhile, to improve the service life of air dryer .

Construction and operating principle

Electronic control air dryer which is shown on figure 1, consists of a cartridge, a main body, a pressure recorded device, a back-flow solenoid valve, an alarm system, an air intake solenoid valve, ECU control unit, an exhaust solenoid valve, a heater and so on.



1. upper room of cartridge, 2. cartridge, 3. dessicant, 4. circular passage, 5. filter, 6. supply port, 7. center passage, 8. air dryer main body, 9. exhaust valve, 10. check valve, 11. exhaust port, 12. pressure recorded device, 13. back-flow passage, 14. back-flow solenoid valve, 15. alarm system, 16. power plug, 17. air intake solenoid valve, 18. LED light, 19. ECU control unit, 20. exhaust solenoid valve, 21. heater, 22. cover, 23. exhaust port

Fig.1 Structure Diagram

The vehicle which is equipped with the electronic control air dryer starting to run, the engine drives air compressor to provide air for the air reservoir of the vehicle, the compressed air which generated by compressor is entering into the dryer via supply port 1, meanwhile, the condensate water of compressed air drops onto the exhaust valve 9 which is below main body 8, as a result, the compressed air flows up to cartridge 2, removing oil and minor impurities by passing the filter 5, afterwards, the air enters into upper chamber 1 of cartridge via circular passage 4, and then adsorbing the moisture which is contained inside of the air through the desiccant 3, finally, the compressed air push open the check valve 10 and output from delivery port 11. Unloading of dryer, back-flow time and time interval can be control automatically by ECU control unit, which can help compressor to startup without load, and also protects the air compressor drive system.

Research and development process

Electronic air dryer was developed base on our existing technology of mechanical air dryer, by using electronic control method to replace mechanical spring pressure-regulating device. It is based on the die casting aluminum alloy shell, getting working pressure through the pressure sensor in real time, and feedback the signal to the assembly ECU, then operating by set program.

With the help of imported ceramic pressure sensor which can get working pressure of braking system accurately without any effect even in high/low temperature, the performance of electronic dryer can be more stable. The control unit ECU consists of circuit board, single chip, cooling system, alarm system and so on, which as the core of intelligent electronic dryer and can be modified by changing program to alter product control logic, thus to apply for various of vehicles. For the control logic, electronic dryer using “time back-flow” to replace the conventional control way “pressure drop”, which makes the dessicant regeneration fully, and longer the service life of cartridge.

In order to adapt to frequent braking of bus, which will always generate low pressure and make the cartridge quick failure because of the dryer is not very good regeneration. Electronic control

dryer added the function of 15 min or 30 min continuously pumping but not exhaust onto the logical program, and ECU will control the assembly to unload and regeneration again. The electronic control unit consists of a triple solenoid valve which controls respectively unloading, back-flow, actuation of cut-in of electronic control dryer.

In order to adapt to the development trend of new energy vehicles, electronic dryer also designed the output control signal port, and the output voltage signal can control the working status of electric driven air compressor via.

In order to prevent ECU damage which generated by power misconnect, the electrical Interface of electronic control dryer was designed as four pins interface which has the function of mistake prevention

Electronic dryer also keeps the heater of conventional dryer, which makes its own to heat the exhaust port under low temperature environment, to prevent freezing and unable to open. The heater and ECU are sharing power input port. In addition, the electronic control dryer added a pressure safety valve, which can protect the brake system from overload at the time of electronic control part failure.

Conclusions

Electronic control air dryer is a fully new product which was developed in a short time by Ruili group ruian auto parts co., LTD., basis on the market-oriented, user-oriented. Its development makes the company going to the diversified development, thus to create a good economic benefits for the company.

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