AUTOMATION AT THE NATURAL GAS INSTALLATIONS

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ABSTRACT

In this work, safety and automation systems and their equipment used in natural gas installations have been studied.

Gas leak detector alarm controller, earthquake alarm controller and solenoid valve will describe. In the conclusion of the research, the necessity and the importance of the safety and automation systems in natural gas installations will be introduced. Furthermore, easy practicability of these systems has been shown.

KEY WORDS*: Natural gas installations, Safety and automation systems.*

1.AUTOMATION AT THE NATURAL GAS İNSTALLATİONS

1.1. NATURAL GAS

Extant at the natural gas % 80-95 methane (CH4),% 5-10 etan (C4 H10) and propane (C3 H8) like hydrocarbons. Slow percent become comprised usually nitrogen (N2), carbon dioxide (CO2), hidrojensulfur (H2S) and helium (He) gases. The natural gas's density is among 0,6–0,8 kg/m3. The natural gas's density is smaller than air's density. The natural gas flies in the weather.

Figure 1. Natural Gas

If natural gas volume's rate is value between percent 5-15 in closed atmospheres. It would show explosive characteristic. If this mixture contacts to flame, it would explode. If

we adapt to standards and if we take necessary precautions, natural gas would be safe from other fuels. Natural gas is an energy source that is commonly used in homes for cooking, heating, and water heating.

Natural gas is not poisonous. However natural gas quantity rises at the weather. Oxygen quantity reduction at the weather will be cause to suffocate.

Since natural gas is not a pure product, when non associated gas is extracted from a field under supercritical (pressure/temperature) conditions, it may partially condense upon isothermal depressurizing an effect called retrograde condensation. The liquids thus formed may get trapped by depositing in the pores of the gas reservoir. One method to deal with this problem is to reinject dried gas free of condensate to maintain the underground pressure and to allow reevaporation and extraction of condensates.

1.2.AUTOMATION UNİTS AT THE NATURAL GAS İNSTALLATİONS

a- Earthquake Gas Shut-off Unit:

This unit constitutes two elements; The seismic action perception detector and Solenoid valve.

b-Gas Alert Detector - Shut-Off Unit:

This unit constitutes two elements; the natural gas alert detector and Solenoid valve.

1.2.1. EARTHQUAKE GAS SHUT-OFF UNIT:

A natural gas earthquake shut-off valve automatically shuts off your gas service when an earthquake of a sufficient magnitude occurs at your home's location. After the quake has stopped and you have determined that it is safe to do so, follow the manufacturer's instructions for restoring your gas service. You will need to make sure no gas leaks exist and re-light your pilot lights. You must ensure that your appliances are safe before operating them. The Gas Company or a service agency can restore your gas service, but remember that it may take many days or even weeks before someone can come to your location in a major emergency. (The Gas Company charges a fee to reset valves and re-light pilot lights.)

1.2.1.1. EARTHQUAKE GAS SHUT-Off UNIT MONTAGE:

- ✓ This unit must be high 180cm from the ground
- ✓ This montage must be rigid
- ✓ This montage must done beams and columns
- ✓ The detector must be maximum 20 meters far from the solenoid valve

1.2.2. GAS ALERT DETECTOR - SHUT-OFF UNIT:

Gas alert detector unit constitutes three elements;

a-Natural Gas Sensor:

Detect dangerous gas leaks in the kitchen or near the gas heater. This unit detects 300 to 5000ppm of Natural Gas. Ideal to detect dangerous gas leaks in the kitchen. Sensor can be easily configured as an alarm unit. The sensor can also sense LPG and Coal Gas

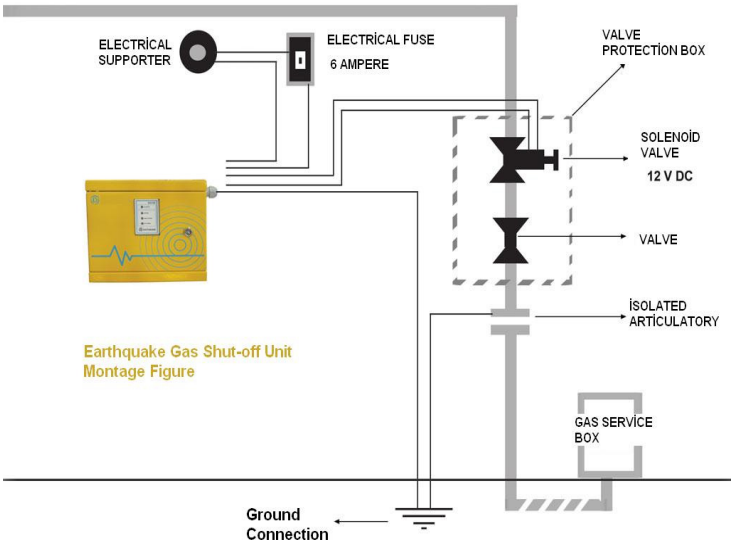

Figure 2. Earthquake Gas Shut-off Unit Montage Figure

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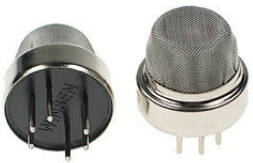

Figure 3. Natural Gas Sensor

b- Electronic Control Panel:

Initial delayed circuit is applied for stabilization of sensor operating. Stable for surrounding temperature and voltage variations. Switching constant voltage method can consume the minimum power and stabilize the sensor. Automatic shut-off the gas valve by transmission of gas leakage signal to control part

c- Warning Mechanisms:

The connection is either to a horn/buzzer on the side panel OR connected to a remute horn / buzzer. The output is 24V – 50ma maximum current. The vocal warning staff member's minimum audio level must become 85-90 decibels over

It is important that the natural gas detector will not be set off by other elements in your home, such as cigarette smoke or humidity level. Many detectors will respond to other dangerous chemicals in addition to natural gas, such as propane (LP). The Lower Explosive Limit (LEL) is the lowest amount of gas that will cause an explosion. Gas detectors vary in the level of gas that will set off an alarm (for example, 15% of the LEL, 20% of the LEL, etc.). Detectors that sense lower levels of gas will warn you more quickly of the presence of natural gas than detectors that sense higher levels. The distance between your gas detector and the potential sources of a gas leak is important. Gas detectors are similar to smoke detectors, in that they need to be installed in a location where their audible warning is likely to be heard and where the material of concern natural gas is likely to accumulate, such as a basement. The installation instructions for your gas detector will assist you in identifying appropriate locations in which to install your detector. If you have multiple sources of natural gas in your home, you might need two gas detectors or one detector with dual sensors. This is especially true if the gas sources are spaced far apart some gas detectors use both a light and a sound to alert you to a gas leak. Some use only a sound. Regardless of which type of alarm you prefer, you should make sure that you will be alerted from any area of your home. An alarm that you can't see or hear will not help you.

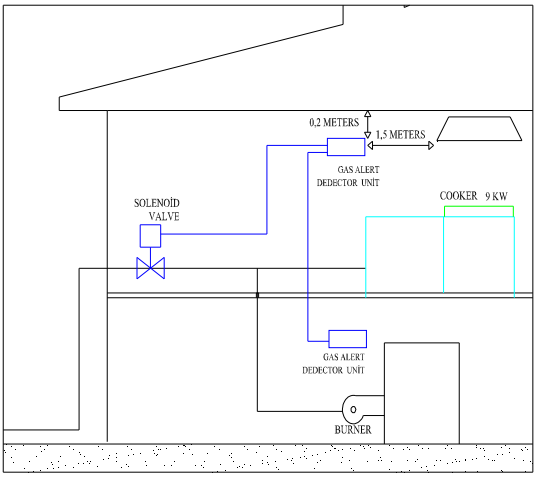

Figure 4. Gas Alert Detector Unit Montage Figure

1.2.3. SOLENOID VALVE

A solenoid valve is an electromechanical valve for use with natural gas controlled by running or stopping an electrical current through a solenoid, which is a coil of wire, thus changing the state of the valve. A solenoid valve has two main parts: the solenoid and the valve. The solenoid converts electrical energy into mechanical energy which, in turn, opens or closes the valve mechanically

Figure 5. Solenoid Valve

Solenoid Valves are simple electrically operated devices. The valve plug is held in place by a spring. When electric power is applied to the solenoid (Energized), the current draw through the coil generates an electromagnetic force which opposes the spring, causing the plug to change position. When power is taken away (De-energized), the spring returns the plug to the normal position. Solenoid valves are ideal for fluid shutoff and switching in general service applications. Proportional solenoid control valves are available for modulating service.

It is an interception normally-open solenoid valve for gas that closes when the coil is electrically supplied. The reset is manual to check the causes for gas detection. During normal conditions there is no electric absorption, no wear and tear and no buzzes or vibrations. It works with gas leak detector alarm controller and earthquake alarm - controller.

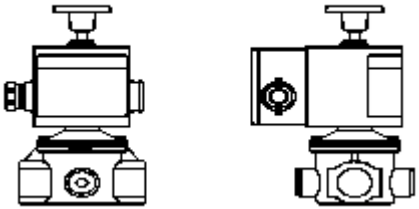

Figure 6. Solenoid Valve

CONCLUSION

Natural gas alarm systems are set up for special occasion like all safety systems. We know that to prevent is easily and cheap than to reparation. To prevent is not only economic benefit, at the same time, this safety systems protects person's health. The necessity and the importance of the safety and automation systems in natural gas installations have been introduced. If user person inform about natural gas alarm systems, it will become prevalent. Also this system's installation cost must be lower.

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