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VCM4156-513 |
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APPLICATION EXAMPLE 01/2013

Sewage treatment plant gas pressure and temperature control

WWTP Schönaich



Introduction

The sewage treatment plant in Schoenaich is designed to clean waste water for 20'000 residents. A biological treatment stage is followed by a digester to generate biogas. The biogas is used in an appropriate CHP to generate electricity, which covers about 35% of total electricity of the WWTP own consumption.

Requirement

Due to the special aggressiveness of biogas, the plant engineers use normally stainless steel or other material which resist these stringent conditions. Pressure and temperature measuring instruments must withstand this environment. In particular, sulphur-containing gas attacks non-ferrous metal components.

Customer's benefit

The use of explosion-protected field devices ensures no risk of ignition through the temperature and pressure switches. An ignition spark could be caused by the switch over of the micro switch. Consequent use of stainless steels and biogas suitable membrane materials are a guarantee for lifelong and safe operation.

Solution

FEMA's customer MUCHE use FEMA pressure switches for pressure sensing in the field of biotechnology and biogas. The area of gas processing and pressure increase devices is declared as an explosion risk area zone 1. With FEMA pressure switches certified for usage in "intrinsically safe" loops together with an isolation amplifier they solve this issue.



APPLICATION EXAMPLE 02/2013

Temperature control of air heater

Decay plant for radio active waste water from nuclear therapy station of a hospital

Introduction

Until 1995 in the newly founded city of Putrajaya, south of Kuala Lumpur, Malaysia, a new National Cancer Institute was built. A part of the hospital is provided with 28 beds for the treatment of thyroid cancer using radioiodine (J131). The effluent from the nuclear therapy department is treated in the so-called decay plant with 4 tanks of 25 cubic meters, before it is discharged into the public sewer system. The entire wastewater system including vacuum toilets to reduce sewage water and is built by a Malaysian-Dutch consortium.

Requirement

The filter unit is used for containment of the radioactive particles in the exhaust air. The material is filtered through a charcoal filter 22F1 impregnated with potassium iodide. The fan 23LG1 produces a continuous negative pressure in the containers. Before the moist air is drawn through the filter unit 22F1, the air is heated. This guarantees that the filter remain in a dry state. In addition, fresh air is drawn. Would not heated fresh air is drawn through the filter, the heated air in the filter could cool down and condense moisture will kill the filter.

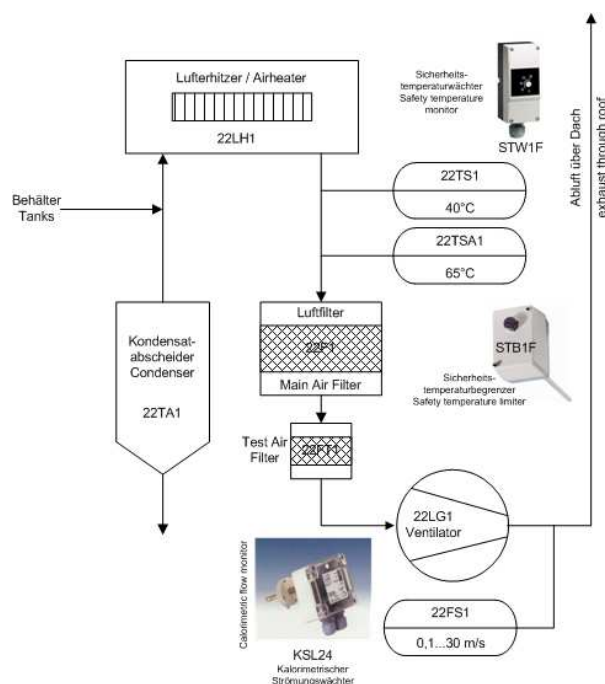
Customer's benefit

The air heater 22LH1 is switched on and off via a thermostat 22TS1 (40°C). The monitoring of the air heater is realized with current flow relay.

The 22TSA1 thermostat (65°C) serves as a safety temperature limiter. Is the temperature rising over 65°C the thermostat 22TSA1 switch off the heater and a fault indication is issued.

Solution

The temperature control (22TS1) assumes a safety temperature limiter STW1F (with a range from 20 to 150°C). If the air temperature rises above 65°C the safety temperature limiter STB1F (60 to 130°C) switch off constantly the air heater and must be unlocked manually by the staff. In addition, the cover of the temperature limiter are sealed. Because of the aggressive exhaust the thermostats are installed in stainless steel immersion wells (1.4571).



APPLICATION EXAMPLE 03/2013

Process pressure monitoring for diaphragm valves

Decay plant for radio active waste water from nuclear therapy station of a hospital

Introduction

Until 1995 in the newly founded city of Putrajaya, south of Kuala Lumpur, Malaysia, a new National Cancer Institute was built. A part of the hospital is provided with 28 beds for the treatment of thyroid cancer using radioiodine (J131). The effluent from the nuclear therapy department is treated in the so-called decay plant with 4 tanks of 25 cubic meters, before it is discharged into the public sewer system. The entire wastewater system including vacuum toilets to reduce sewage water and is built by a Malaysian-Dutch consortium.

Requirement

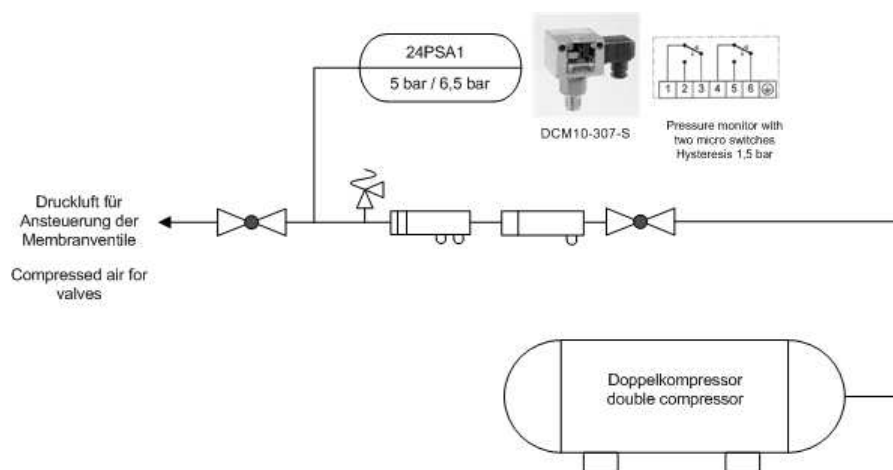
The compressor produces a nominal pressure of 10 bar air. For the control of many diaphragm valves, a nominal pressure of 6 bar is required for safety reasons, which must be monitored. The valves must open and close according to the requirements ensure that no radioactivity can be deported.

Customer's benefit

The mechanical pressure switch gives the operator of the facility, the safety that the required air pressure for the control of various valves is always guaranteed. With a pressure switch, the operator can monitor via a programmable logic controller (PLC) the maximum and minimum pressure.

Solution

Together with the engineering company we decide us for a DCM10-307-S pressure switch with two successive switching micro switches. The switching differential was factory set at 1.5 bar. Thus, the compressor will be directly switched off at 6.5 bar and a safety vent will be opened. If the pressure fall down to less than 5 bar an alarm is generated by the PLC and the plant goes into fail-safe mode.



APPLICATION EXAMPLE 04/2013

Monitoring of air blowers for aeration of decay tanks and a fan for exhaust air ventilation.

Decay plant for radio active waste water from nuclear therapy station of a hospital

Introduction

Until 1995 in the newly founded city of Putrajaya, south of Kuala Lumpur, Malaysia, a new National Cancer Institute was built. A part of the hospital is provided with 28 beds for the treatment of thyroid cancer using radioiodine (J131). The effluent from the nuclear therapy department is treated in the so-called decay plant with 4 tanks of 25 cubic meters, before it is discharged into the public sewer system. The entire wastewater system including vacuum toilets to reduce sewage water and is built by a Malaysian-Dutch consortium.

Requirement

The decay tanks with the waste water must be aerated at regular intervals, to serve the homogenization of the waste water. The operation of the aeration is ensured by two blowers with a maximum capacity of 10 m³ / h each.

The fan runs continuously and must be monitored for its function. The monitoring only through a current flow relay isn't enough for the operator. The engine could run but no air is support.

Customer's benefit

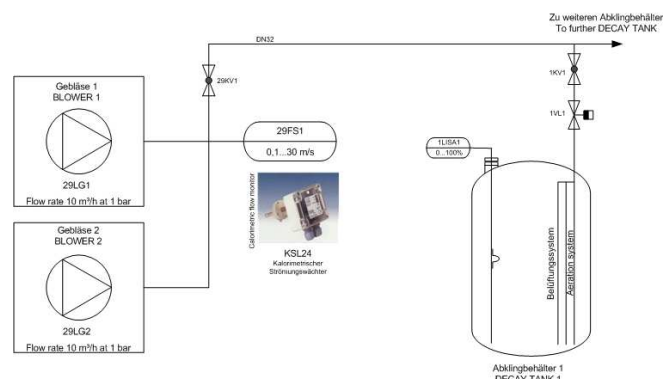
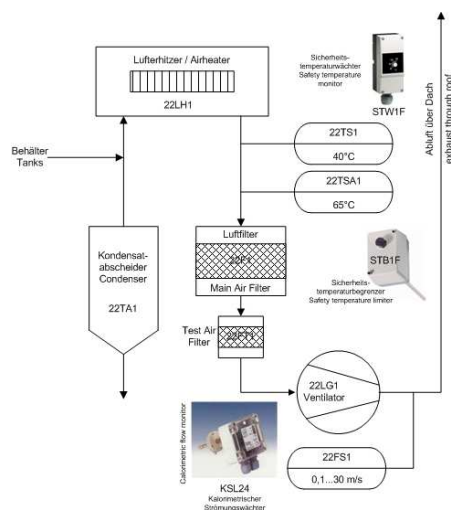
The operation of the airflow to the decay tanks with a calorimetric flow switch (29FS1) is safely monitored. Is the PLC turn on the blower after a certain time the flow monitor have to responding. Unless there is no digital signal detect by the PLC there will be set up an alarm.

Since the fan is running in continuous operation, is continuously pending a binary signal in the PLC. If the air flow below the set value, an alarm is generated.

Solution

Both air flows are monitored with a contactless calorimetric flow switch KSL24. The sensitivity and the switching point can be very precisely adjusted via a potentiometer. The switching point is indicated by a yellow LED. By choosing the compact unit (sensor and electronics are located in one housing) is no additional space needed in the control cabinet.

Operating method: A thermistor is heated up, the flowing medium absorbs heat and change the resistance value. As the resistance also depends on the temperature of the medium, the difference is determined by a second thermistor and the temperature deviation is compensated. In this way the switching point remains stable. Suspended materials adhering to the sensor can have an insulating effect and so affect the measurement result and hence the defined switching point.



APPLICATION EXAMPLE 05/2013

Differential pressure switch in transparent IP65 Bopla housing for outdoor use.

Exhaust air controlled removal of coating lines

Introduction

It should be ensured that the partially toxic and combustible exhaust air gases of the coating lines are routed securely to the atmosphere after purification.

Requirement

How can be ensured that the solvent-containing exhaust air from paint lines is reliably feed into the atmosphere, is not feed back into the production hall and can endanger the health of employees?

Customer's benefit

The HCD6003 differential pressure switch with a measuring range of 0.2 ... 3 mbar ensures that the exhaust air gases are not released into the production halls. This is also a safety aspect for the staff. An additional benefit is the prevention of the emergence of a hazardous zone.

Solution

If a minimum pressure between the exhaust air and the atmosphere is reached, an additional exhaust fan is turned on. The differential pressure switch HCD6003 with the approval by the DVGW for air and combustion gases (G 260) takes over this task reliably.



HCD6003

APPLICATION EXAMPLE 06/2013

Intrinsically safe pressure switch with 1m pipeline and flanged pressure mediator

Waste water tank in a submarine

Introduction

Maximum pressure monitoring in a closed water tank of a submarine.

Requirement

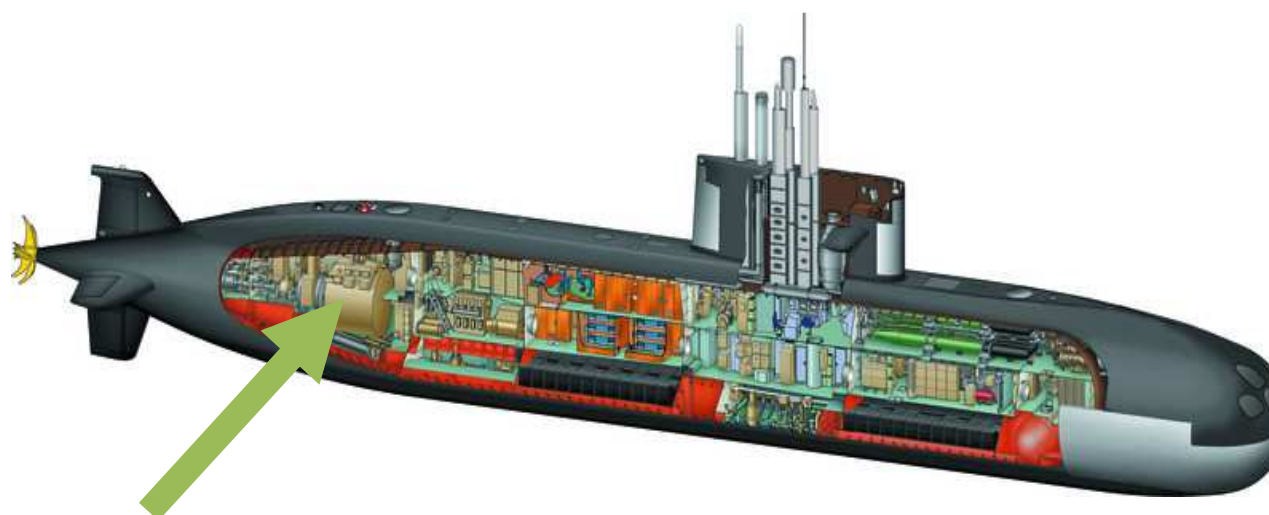
An alarm is set up when the pressure in the tank is higher than a predetermined value. The tank can now be de-aerate or discharged (maximum pressure through sludge gas or maximum level).

Customer's benefit

The maximum pressure limiter DWAM6-577 with internal interlock ensures that no life-threatening situation for the crew and the submarine itself arises.

Solution

Intrinsically safe DWAM-maximum pressure switch with internal interlock in security technology with flange DN50 in hazardous area 2.



APPLICATION EXAMPLE 07/2013

Automatic leakage detection by type-tested pressure switch

Monitoring of geothermal probes for the operation of heat pumps

Introduction

Geothermal probes are installed in vertical wells with depths of usually 40 to 150 m. The probes are typically bundled pairs of U-shaped plastic tube loops that are connected near the Earth's surface over the manifolds to a heat pump. In the probe circuit circulates a heat transfer fluid, usually a water-antifreeze mixture, which is referred to as brine and accommodates the existing underground energy.

Requirement

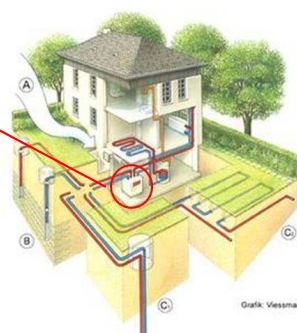
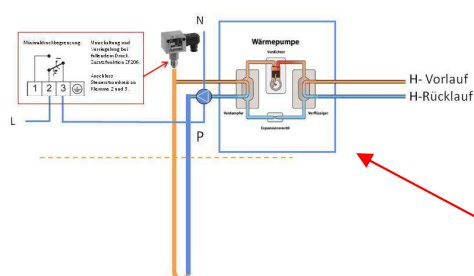
Borehole heat exchanger systems are to be secured by automatic leakage monitoring devices (the reliability of pressure monitors and limiters must be certified by a component test which is performed by the testing agencies). In case of leakage of the borehole the circulating pump must be switched off immediately and an alarm is set up.

Customer's benefit

The minimum pressure limiter DWR3-206 is through the examination with 2 million operating cycles and its approval to TRD 604, EN 12828, G 260 and DIN EN764-7 particularly suited for this task and is accepted by the water authorities as a safety device.

Solution

Once the pressure drop in the collector (e.g. due to a leakage) the pressure monitor have to switch off the circulating pump P. Depending on the size and design of the system and relevant legal requirements can be set up an alarm, pump down the brine, switched off the heat pump, or other actions can follow.



APPLICATION EXAMPLE 08/2013

Pressure monitoring for piston compressors

Josef Mehrer GmbH in Balingen,
Germany

Introduction

With the foundation in 1889, Mehrer is one of the oldest and most traditional compressor manufacturers in the world and is today one of the leading producers of oil-free piston compressors for technically demanding tasks

Requirement

The company Mehrer is specializes in the field of gas compression and here they offer numerous different expert solutions.

Customer's benefit

Mechanical pressure switches are used to monitor the input and output pressures of the piston compressor. As well, the oil pressure of the compressor is monitored.
In many special applications, the pressure switches must be approved for use in hazardous areas.

Solution

They use three explosion proof pressure switches. They belong to the type series EX-DWR which are designed according to ATEX.
The input pressure and the oil pressure are monitored by the EX-DWR6 with a range of 6 bar. For monitoring the output pressure an EX-DWR25 is used (range up to 25 bar).



APPLICATION EXAMPLE 09/2013

Pressure monitoring in SF6 maintenance devices

DILO Armaturen und Anlagen GmbH
Babenhausen, Germany

Introduction

The field of competence for SF6 gas handling is now the main source of revenue for DILO. As the world's leading brand DILO has all the resources and know-how to react quickly and flexibly to individual customer requirements.

Requirement

DILO manufactures maintenance equipment for the handling of SF6. These include the following functions:
Exhaust of SF6 gas
Cleaning and drying
Storing the gas
Evacuating of air and nitrogen
Filling gas spaces with SF6
SF 6 has very detrimental effects on the environment, so the devices has to be very closed.

Customer's benefit

The mechanical pressure switches DCM series are monitoring the vacuum pump (gas suction).
Due to the high density version of the pressure switch (QL < 1.4 * 10E-4 mbar l / s), DILO can specify a high density of its service units.

Solution

DILO use a DCM3 mechanical pressure switch.
All components of the sensor are made of stainless steel, is fully welded and has no gaskets.
The operating range is up to 2.5 bar.



APPLICATION EXAMPLE 10/2013

Pump monitoring with a pressure switch

Heat11
Public cleansing service Hamburg
Composting plant Bützberg



Introduction

70'000 tons of Hamburg's green waste and waste from the "Green tons" be converted into biogas and purified and feed into the gas grid of Hamburg. The bio methane gas annually produced in the biogas and composting plant in Buetzberg is equivalent to the electricity needs of more than 11'000 households. About 8'200 tons of CO² will be saved.

Requirement

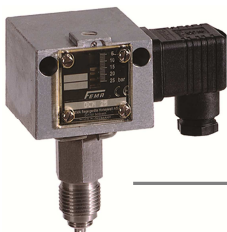
For the safety and continuously operation of the gas purification they need a redundant system of pumps which should be switch over if necessary. The decisive factor is the switching and resetting behavior of the used pressure switch. A defined hysteresis of 150 mbar, and the availability of safety parameters to calculate the failure probability are helpful.

Customer's benefit

Safeguarding of the continues operability of the whole system, even if one pump fails. When the pressure drops, the pressure monitor switch over to the next path of the pump.

Solution

For pump monitoring in the area of gas processing the setting of the pressure switch DCM6 is at 3 bar falling. This allows a safety and redundant operation of the pumps in case of failure.



APPLICATION EXAMPLE 11/2014

Level measurement in storage tanks using the air-bubble method

Level measurement of heavily contaminated liquids

Introduction

In tanks or rain overflow basins with faecal contamination, the level should be monitored and, depending on the given level, inlet valves or pumps controlled via a PLC (programmable logic controller).

Requirement

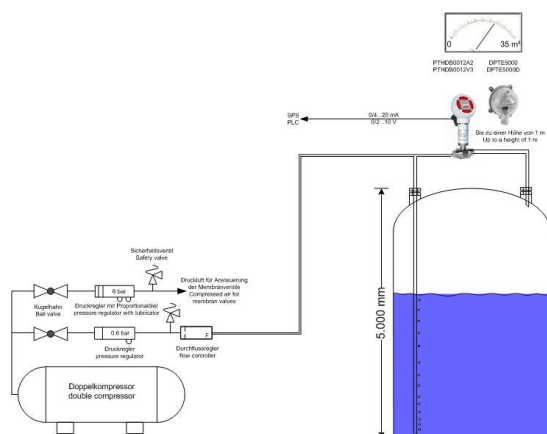
The selected measurement principle should also be used in vacuum vessels. The foaming problem should not affect the measuring result.

Customer's benefit

Because of the steady injection of air, the measuring tube is not filled with the medium to be measured. Another advantage is the very low maintenance. This method is suitable for measuring liquids with higher temperature. Depending on the height to be measured, even inexpensive differential pressure transmitters can be used.

Solution

This method of level measurement uses the pressure of the water column. In the container, a pipe is built in, which reaches almost to the ground. The pressure of the air supplied is higher than the back pressure of the water column in the measuring tube. The positive pressure appears in the form of small bubbles which emerge from the pipe at the surface. Thus, the back pressure is a measure of the pressure at the bottom of the tube, which is proportional to the height of the medium. Since the tube has a fixed mounting position, this back pressure changes whenever the level of the medium changes. This hydrostatic pressure with respect to the atmospheric pressure is evaluated by a differential pressure transmitter.



APPLICATION EXAMPLE 12/2014

Flow monitoring in Emergency showers

Flow monitoring of liquid and gases in pipes

Introduction

In order to provide immediate first aid and to avoid possible contamination of the bodies of accident victims, body safety showers must be installed.

A source of water - at least 30 liters per minute, and having drinking water quality if at all possible - are required.

From any place in the laboratory a body safety shower should be reachable within a maximum of 5 seconds. The shower should be positioned on the basis of a hazard evaluation.

Requirement

Standard designed showers for bathrooms and water spouts are not suitable.

Safety showers have the outlet at a height of 2.20 meter and shall be designed so that the entire body of a human can be optimally washed up.

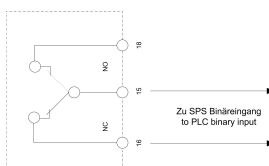
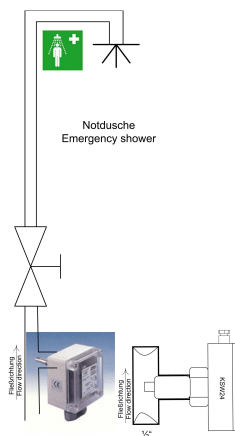
Customer's benefit

Emergency sensors are necessary in case no other person is near to an injured person and capable of rendering assistance. The emergency sensor sends a signal to the control room as soon as water begins to flow.

Solution

Once the water valve is opened, the compact flow sensor KSW24 or KSW230 transmit a signal to the control room.

If the sensor is installed upstream of the valve in the vertical inlet pipe, it can be ensured that the flow sensor is always in a filled pipe and that no false alarms generated by fluctuating water levels are triggered. The sensor is installed in a tee in the line and has no moving parts which could wear out. The electronic flow monitors work according the calorimetric principle. A thermistor is heated up. As heat is withdrawn by the flowing medium, the thermistor resistance alters. The change in resistance is evaluated. As the resistance also depends on the temperature of the medium, the difference is determined by a second thermistor and the temperature deviation is compensated.



APPLICATION EXAMPLE 13/2014

Pressure Monitoring in Bio-Energy Power Plants

BioEnergie, Taufkirchen, Germany

Introduction

The BioEnergy Taufkirchen power plant in Taufkirchen near Munich is a natural wood biomass-fired cogeneration plant. The plant generates energy according to the principle of thermal and electrical cogeneration; the resultant electricity is fed into the public grid and the thermal heat is fed into a local district heating network.

Requirement

In this power plant, FEMA pressure switches and pressure limiters control are used in the following segments:

- Steam boiler
- Steam turbines
- Heating transfer stations
- Pump stations

Customer's benefit

Mechanical pressure limiters with TÜV and SIL approval are used for safety monitoring of the aforementioned functions.

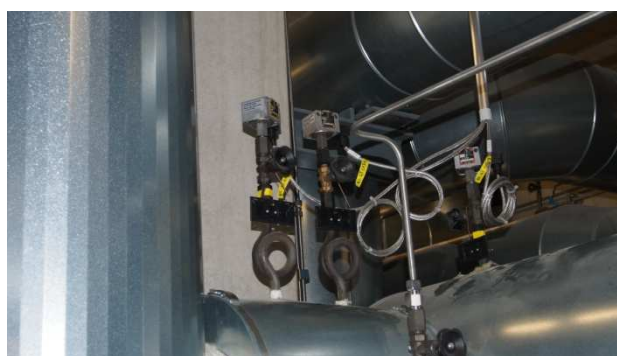
Mode selection:

- selections 2 out of 3
- and 1 out of 2.

Solution

In this project they use the pressure limiter series DWR-B.

The SIL-parameters according to IEC61508-2 were present.



APPLICATION EXAMPLE 14/2014

Pressure Monitor and Pressure Limiter for LPG

Self-monitoring pressure sensors meet the requirements of TRB 801 Annex II § 12

Introduction

In Europe, about five million vehicles currently use LPG (liquefied petroleum gas). In many large cities around the world, due to increasing environmental awareness, public transport runs on LPG. Forklift trucks and other material handling vehicles use LPG as an ideal driving energy.

Sales of LPG in Germany are growing by approx. 5% per annum; this is due in part to its use in low energy houses.



Requirement

All fittings, valves, modules and aggregates have to meet the requirements of ATEX (Zone 1), the Machinery Directive and the Pressure Equipment Directive 97/23/EC.

Pressure sensors must be carried out according to EN60259 in protection class IP65.

Customer's benefit

The feature "self-monitoring sensor" according to VdTÜV Druck 100 is reached with the actuating plunger attached to an auxiliary diaphragm. This is installed as a tight partition between sensor and controller. On breakage of the measuring bellows, the medium can escape into the interior of the bellows. The medium pressure is now on the underside of the diaphragm. An additional force is generated because of the far larger effective area of the diaphragm compared with the bellows, and this pushes the transfer bolt upwards. This results in cut-off to the safe side.

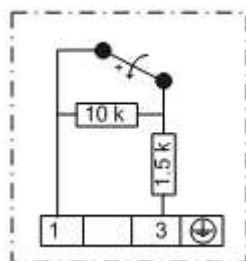
To calculate failure probabilities in combination with control and drive components of process engineering and mechanical engineering, FEMA provides the required parameters (SIL 2 according to EN61508-2).

Solution

A pressure monitor FD16-236 becomes a pressure limiter if an electrical interlock is connected in series. The reset is only possible if the pressure is lowered by approx. 2.5 bar.

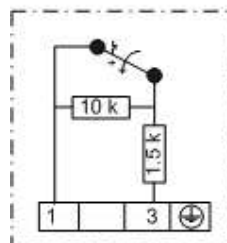
The FD16-327 is designed as a pressure limiter (with internal interlock). After reaching the set point, the pressure limiter is automatically mechanically locked and can be unlocked only after lowering the pressure by approx. 2.5 bar.

By combining the unit with an intrinsically safe isolating amplifier (mounting outside the Ex-zone) and the FD16-pressure switch series as Ex-i version the ATEX requirements are fulfilled.



FD16-326

Single-pole changeover switch with resistor combination for line break and short-circuit monitoring.



FD16-327

Single-pole changeover switch with mechanical switching state interlock on reaching maximum pressure and with resistor combination for line break and short-circuit monitoring.

APPLICATION EXAMPLE 15/2014

SCR - Selective Catalytic Reduction - Emission Control for marine engines

Pressure switch with adjustable switching
differential, Sensor material: 1.4571

Introduction

As environmental regulations become more stringent, waste gas treatment systems are growing in importance.

Treatment of exhaust gas using integrated Selective Catalytic Reduction (SCR) systems is essential for achieving significant and sustainable reductions in NO_x values. The SCR method is based on a reaction of the NO_x present in the exhaust gas with ammonia (NH₃) derived from an injected urea solution.

The NO_x is converted into harmless nitrogen (N₂) and water vapor.

Requirement

The particular aggressiveness of urea solution requires a high quality of stainless steel.

The constant pump control between 6-7 bar provides for continuous and demand-based injection of the urea solution.

Customer's benefit

Pressure switches of the DNS series are made of high-quality stainless steel (1.4571) and welded using the latest methods without filler metals. Further, the sensor is gasket-free plasma welded.

The customer can be confident that the pressure switch will withstand the urea solution

Solution

The advantage of FEMA pressure switch DNS10-203 (with adjustable switching difference) is the media-resistant sensor material and the compact design. The robust industrial model guarantees safe and continuous operation with low maintenance.



APPLICATION EXAMPLE 16/2014

Biogas Upgrader Biogas to Biomethane

Pressure monitor "of special construction"
by testing for 2 million cycles

Introduction

Biogas from renewable raw materials is an environmentally-friendly, inexhaustible energy source.

To use this gas for motor vehicles equipped with natural gas engines and for power supply, it must, however, be purified and concentrated. In its unprocessed state, biogas (containing only 50-54% methane) has only half as much energy as natural gas. In addition, it is moist and warm and contains harmful hydrogen sulfide.

The biogas amplifier increases the methane concentration from 50% to 96%. At the same time, it lowers the hydrogen sulfide content to below 5 ppm and eliminates the water.

The result is biomethane in natural gas quality in accordance with the requirements of DVGW worksheet G 260. It can be used reliably and safely in natural gas car engines as well as in combined heat and power engines (CHP).

Requirement

In the Biogas Upgrader, the raw gas is compressed to 7 bar and cooled down. Afterwards, the gas passes through an absorption column with a washing solution in which carbon dioxide, harmful hydrogen sulfide, and water are removed.

The biogas escapes at the top of the column. It can be forwarded directly to the consumer. The washing liquid is regenerated in a second column.

Customer's benefit

In the case of pressure switches "of special construction" according to VdTUEV Pressure 100, it is assumed that the pressure sensors which have withstood a dynamic loading of 2 million operating cycles during component testing can be considered as reliable.

To calculate failure probabilities in combination with control and drive components of process engineering and mechanical engineering, FEMA provides the required parameters (SIL 2 according to EN61508-2).

The Biogas Upgrader ensures an economical use of biogas in conjunction with natural gas pipelines. Even CHP locations with a low usage of heat are of economic interest.

Solution

The pressure monitor DWR6 with an approval for fuel gases according to DVGW worksheet G260 is used for pump monitoring. When exceeding the set point, the solvent pump is switched off. Thus, a burst protection for pipelines and tanks is ensured.



APPLICATION EXAMPLE 17/2014

Monitoring of fuel supply

Introduction

Ensuring the diesel fuel supply in a ship or a diesel locomotive is essential to prevent accidents and mishaps.

Requirement

Monitoring the minimum pressure in the diesel fuel line for timely warning of the impending failure of the engine and the consequent loss of control of the vehicle.

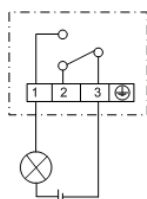
Customer's benefit

The installation of a pressure switch in the fuel supply warns the driver of the imminent threat of power failure and enables him to take countermeasures.

Solution

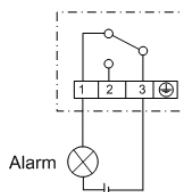
The installation of a DWR6 pressure switch in the diesel supply monitors the minimum pressure in the line and triggers an alarm if the pressure reaches the set point.

Therefore an unexpected engine interruption is excluded.



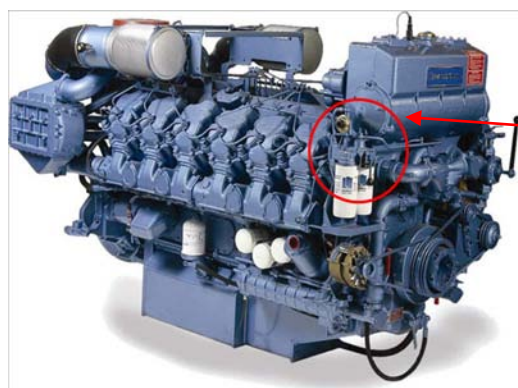
Normal operation:
Pressure in the fuel supply > 3.2 bar

If the engine is started, the pump is switched on and the pressure in the fuel line increases to 5 bar. The switching point of minimum pressure switch DWR6 was set at 3 bar falling. As the switching differential is 0.2 bar, the pressure monitor switches in the position shown here at 3.2 bar.



Pressure in the fuel supply 3 bar
→ Alarm

The picture above shows the switching state for 3 bar falling. An alarm is triggered. If the pressure rises to 3.2 bar, the alarm is reset.



APPLICATION EXAMPLE 18/2014

Redundant pressure monitoring in a high-altitude test facility

University of Stuttgart
Institute of Aircraft Propulsion Systems

Introduction

The Institute of Aircraft Propulsion Systems at the University of Stuttgart performs checks and measurements on turbines and has a high-altitude test facility. Besides testing entire engine systems under flight condition, core engines and engine components undergo tests on this universally applicable facility.

Introduction

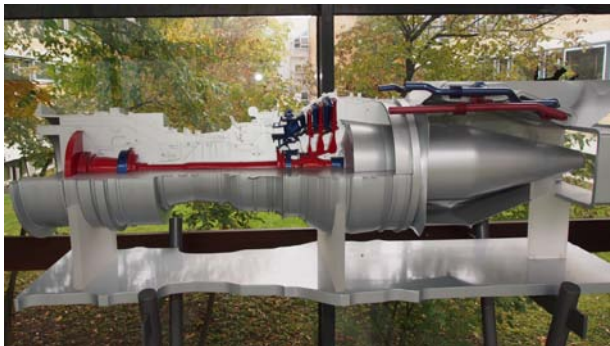
The altitude test facility must control the seal of the test cell for engines.

Customer's benefit

Mechanical pressure switches are used for safety monitoring of the test cell's seal. For safety reasons, a selection of 1 of 2 evaluations is used.

Solution

Two DCM1000 and one DCM10 mechanical pressure switches are used for the redundant monitoring of the seal for the engine test cell. The set points of the two DCM1000 are 20 mbar and monitor the minimum pressure. A 1 from 2 selection is used. The DCM10 control the maximum pressure. The set point is 2 bar. All pressure switches fulfill the requirements for "functional safety in plants" - abbreviated SIL2.



APPLICATION EXAMPLE 19/2014

Nitrogen leakage monitoring

Operating pressure monitoring of the fuel system

University of Stuttgart
Institute of Aircraft Propulsion Systems

Introduction

The High Altitude Test Facility of Stuttgart has been in service since 1964 and has steadily been extended and adapted to the changing customer needs. Many successfully conducted projects in the area of engine- and engine component test document the capability of this facility, which is unique in Germany. Besides testing entire engine systems under flight condition, core engines and engine components undergo tests on this universally applicable facility.

Facility performance data

- Through flow air supply up to 140 kg/s
- Air condition adjustable between -60 °C and 170 °C at a pressure of 0,05 up to 2.5 bar
- Compressor test up to 3500 kW
- Turbine test up to 10'000 kW
- Simulated altitude up to 20km
- in flight Mach number up to Ma=2.2
- Measurement data acquisition unit with automated processing of 1036 pressure tapings and 540 temperature measuring points
- Laser-aided velocity measuring

Customer's benefit

Electronic pressure switch with two switching points and adjustable hysteresis, can monitor different aggregate states on the same process connection.

Smart Press PST units have in addition to the two digital outputs an analog output 0...10 V or 4 ... 20 mA.

A warning function also exists for a sensor fault, overload, or overheating.

The graphical display shows the current pressure and the tendency of the pressure curve.

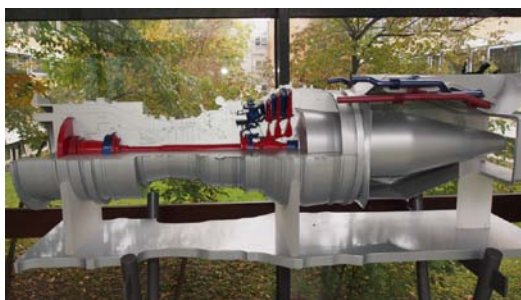
Solution

Leakage monitoring:

The electronic pressure switch PSTV01RG12S with two configurable open-collector switching outputs is monitoring the nitrogen supply of the test facility.

Operating pressure monitoring:

A PST010RG12S electronic pressure transmitter controls the pressure of the fuel supply of the test equipment in the range 0...10 bar.



APPLICATION EXAMPLE 20/2014

Solenoid valves as a safety device to prevent siphoning of fuel oil

Safety shut-off according to DIN-EN ISO 23553-1

Introduction

In Germany, about 6.3 millions oil heating systems are in operation. §62 WHG* describes the construction for a safety operation of a fuel oil supply systems to avoid siphoning.

DIN ISO 23553 specifies the requirements for safety, construction and performance as well as the testing of automatic and semi-automatic valves for oil.

Requirement

"Siphoning" means the risk of leakage of oil during the interruption of the burner or oil pumping unit by the hydrostatic pressure of oil in the pipeline.

This risk exists when:

- the maximum level in the oil tank is above the lowest point of the pipe
- a discharge pipe acting as a suction line is below the highest liquid level in the oil conveyor

Customer's benefit

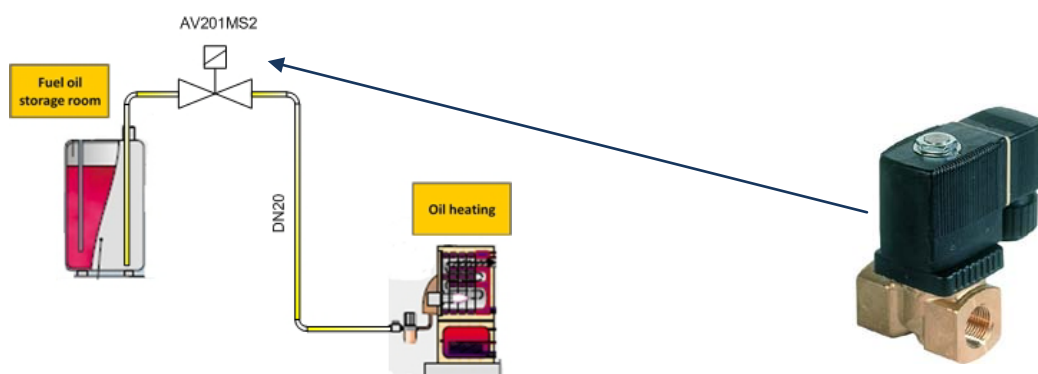
Solenoid valves are an important part in the control loops of oil burners. There are high demands on quality, reliability, and durability to ensure undisturbed (low-maintenance) operation.

FEMA solenoid valve series "AV" have a TÜV approval according to DIN EN ISO 23553-1.

Solution

The solenoid valve of the type series "AV" is electrically connected parallel with the oil burner. It is normally closed on burner shut down and shuts off the oil line. With start-up of the burner pump, the solenoid-valve opens.

The safety device against siphoning is installed in the highest point of the pipe. Consequently, there is no oil flow as long as the solenoid valve is closed.



* WHG = Gesetzes zur Ordnung des Wasserhaushalts
Act on the regulation of matters pertaining to water (Federal Water Act)

APPLICATION EXAMPLE 21/2015

Pressure monitoring of a process heat generator in a brewery

Introduction

There are four essential ingredients for making a good beer: hops, malt, water, and steam.

Steam is needed both to heat up the mash and to clean the bottles. The components of the corresponding heat generators must be absolutely reliable and operationally safe. Of course, as safety-relevant components, pressure monitors must fulfil the provisions of the Pressure Equipment Directive PED 97/23/EC - category IV.

Requirement

In the case of process heat generators, the following function must be safely and reliably monitored:

Shut-off in the event that the set maximum pressure is exceeded.

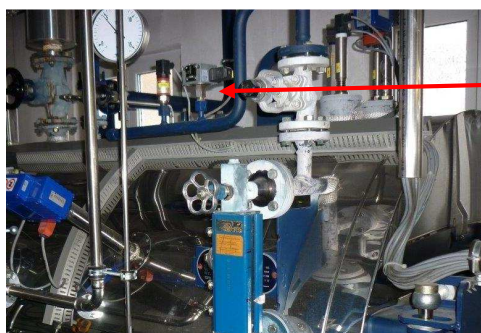
Customer's benefit

The reliable and long-term precision control of the boiler pressure when generating heat is a prerequisite for ensuring that there is always sufficient process heat for clean and sterile manufacturing processes.

Solution

The Schimpf Brewery in Remmingsheim uses a FEMA "DWR" maximum pressure monitor to control the process heat generator. As soon as the maximum pressure is reached, the burner is shut down, thus preventing a rupture of the boiler.

In addition to certification according to PED 97/23/EC, FEMA DWR SIL 2 are classified according to IEC61508.



FEMA DWR pressure monitor of „special construction“, tested with 2 million operating cycles

APPLICATION EXAMPLE 22/2015

Control and monitoring of compressed air in the seals of 8-m-high doors in hazardous area

Soyuz refueling building in Kourou
French Guiana

Introduction

On behalf of Arianespace in Kourou (French Guyana), MT Mechatronics has created a new building for the fueling of Soyuz launchers. The rocket's upper stage (Fregat), which is used for starting high-orbit satellites (geostationary communications satellites) and spacecraft are refueled there. The Fregat can be re-ignited up to 20 times and is therefore suitable for launching multiple satellites into different orbits.

Requirements

The refueling area is located in a hazardous area. All components used must be certified for use in hazardous areas.

To seal the doors, air-filled rubber seals are used.

Customer benefits

With the new refueling building (NBR), Arianespace now has a facility which significantly shortens the complex process of refueling the Fregat. Associated with this are significant cost-savings and a shortening of the entire Soyuz launch campaign.

Solution

For controlling and monitoring the air pressure in the rubber seals of the 8-m-high doors, Ex-d pressure switches are used: EX-DWR1 (0.2 ... 1.6 bar) and EX-VNM111 (-1 ... + 0.1 bar).

FEMA Ex pressure switches are IEC-EX certified and thus very well suited for applications in international projects.

The pressure switches of the EX-DWR series are also certified according to DIN EN 764-7 (pressure tank) and are classified on the basis of 2 million operating cycles as pressure switches "of special construction".

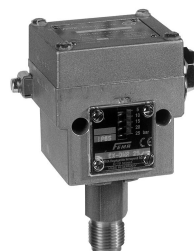
All mechanical pressure switches from FEMA are rated SIL 2 according to IEC 61508-2.



Source: MT Mechatronics



Source: NASA/SSR Academy of Sciences
NASA Images at the Internet



FEMA EX-DWR pressure switch "of special construction" tested with 2 million operating cycles

APPLICATION EXAMPLE 23/2015

Pressure monitoring in steam boilers for weed control

MÖSCHLE – Dämpftechnik MSD GmbH
Durbach, Germany

Introduction

For more than a century, steaming has been used in horticulture and agriculture. In particular to protect plants against all kinds of weeds, the use of steam has proven itself for decades. Steam kills all weeds and seeds in the treated soil purely by heat. It can be done under glass or outdoors. The result is always a completely weed-free soil, ideally prepared for the cultivation of plants.

Requirements

In this low-pressure steam boiler, several functions are to be reliably monitored:

- Two-stage burner control
- Pressure limitation

Customer benefit

The boiler produces superheated steam (200°C) at low pressure. The normal operating pressure is approx. 0.5bar – the maximum operating pressure is 1 bar. In the case of failure of water supply or excess pressures and temperatures, the boiler shuts off and locks out automatically. This prevents spontaneous restarting.

Solution

Three pressure monitor DWR1 "of special construction" tested with 2 million operating cycles will be used.

All mechanical pressure switches from FEMA are rated SIL 2 according to IEC 61508-2.



DWR1 (Pressure Monitor "of special construction")

APPLICATION EXAMPLE 24/2015

Temperature control of a solid waste incinerator for solid waste

Introduction

Incineration of liquid and solid waste is considered to be an environmental friendly method of waste management. The shipboard incineration of solid waste with local management of sludge and oil is recommended by the International Marine Organization (IMO).

Requirements

What can be incinerated?

According to IMO regulations, the following solid and liquid waste can be burned in an IMO-certified shipboard incinerator:

- Plastic, cardboard, wood
- Rubber, cloth, oily rags, lub oil filters
- Diesel engine scavenge scraping
- Paint scraping
- Food waste, etc.
- Sludge oil, waste lubrication oil
- Hospital waste, feminine hygiene napkins
- Contaminated water

Customer benefits

Marine incinerators are computerized (PLC) to make the daily use simple, automated, and safe over a long product life, and always ensure compliance with the IMO regulations.

Solution

The customer uses a FEMA rod thermostat TXB490 with an immersion well R20/MS. Due to the fact that FEMA can provide the thermostat with SIL 2 according to IEC 61508-2, they have the necessary safety parameters to be awarded the DNV certificate for the incinerator.



Housing:
Diecast aluminium GD Al Si 12
according to DIN 1725



Thermostat TX

APPLICATION EXAMPLE 25/2015

Vacuum ovens in metallurgical refining

Fa. Schmetz GmbH

Introduction

Vacuum ovens are employed for hardening, tempering, annealing, brazing, and sintering metals. After loading the charge, the vacuum oven is evacuated. The chamber is then heated up and the temperature maintained, followed by complete quenching. Depending on the steel grade, the most suitable cooling medium is selected, such as nitrogen or argon.

Requirement

The pressure switch has to be vacuum-tight and monitor a pressure in the lower mbar range despite the fact that the maximum system pressure is up to 12 bar.

Customer's benefit

With the applied pressure switch DCM 506-301, we cover a setting range of 15-60 mbar and a maximum pressure of up to 12 bar.

This guarantees reliable switching and completely satisfies our safety concept.

Solution

The high system pressure are possible only through the use of a stainless steel sensor. At the same time, the pressure switch has SIL certification (SIL2) and corresponding specifications as set forth by the Machinery Directive DIN EN ISO 13849-1.

