



ASCON Application Note

Cryogenic gas filling station

Ascon SigmaPAC is being utilized in a plant that fills compressed gas cylinders. This plant includes a central cryogenic tank, a high-pressure pumping station, a vaporizer, and several individual filling stations. The plant requires controls to be mounted locally at each station but connected with a distributed supervisory system.



The application

The process uses the controlled low temperature technology that compensates the heating generated by the compression of the gas into the bottles.

Main variables and data to be monitored and controlled to guarantee the correct and safe automatic operation of the plant include:

- Temperature of the liquefied gas at the pump delivery
- Temperature of the gas downstream of the vaporizer
- Temperature of the pump filling station
- Temperature and pressure at the bottle filling stations

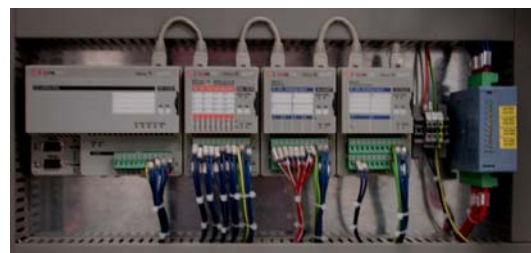
Temperatures are controlled by opening and closing different valves, while pressure is controlled by acting on the pump. Interlocks and alarms are provided for several conditions such as: pump filling station leakage, pump start-up failure, high pressure, and diagnostics of the connected Sigma I/O modules.

The control system needs to be flexible to work with different types of gases and to manage plant options such as the possibility to use a static filling system. Also, the plant is required to meet the safety regulations of the local authorities for worker safety.

Ascon SigmaPAC Solution

Ascon proposed a complete solution inclusive of CPU, I/O modules, and operator touch panel.

Analogue I/O modules acquire all the temperature and pressure signals.



The Control Unit (CPU) controls the pump and the temperature control valves. All parameters are available on the operator panel which is connected via dedicated serial communications.

Based on the measured temperatures and related thresholds, the CPU controls the pump in normal conditions, but also takes action in the event of a malfunction. It is especially important to shut down the system in case the vaporizer temperature is too low (related equipment is not designed for cryogenic temperatures and may be damaged).

Selected Products

The control and acquisition system is based on several modules:

Central Control Cabinet

Model	Description
IO-CB/AI-04-RT	4 Channel RTD, TC, mV inputs
IO-CB/AI-02-UI	2 Channel Universal inputs
IO-CB/DM-16-TS	8 Channel Digital 24 Vdc Inputs + 8 Channel Digital 24 Vdc Outputs
CU-02/5010	Programmable Automation Controllers (PAC) CPU provided with: IEC 61131-6 programming languages Ethernet port for SCADA and high level connection Two RS232/RS485 ports for Modbus communication and data acquisition RS232 port for programming and configuration CANOpen port for connection to I/O modules
OP-35 or OP-8056	5.6" touch screen operator panel

Remote Cabinet

Model	Description
IO-CB/DM-08-TS	8 Channel Digital Configurable as 24 Vdc Inputs or 24 Vdc Outputs

System Advantages

The Ascon system was the preferred solution based on the following specific characteristics:

- Modules are stand-alone, with built-in Fieldbus interface and power supply thus allowing to be a truly distributed system;
- Modules are intelligent which takes the burden off the CPU and increases connectivity speed;
- Modules can be easily configured as inputs or outputs;

ASCON and its network of distributors and system integrators are available to discuss the best solution for your applications.

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