SWISSGAS AG'S RUSWIL METERING STATION

gas-net in large-volume metering

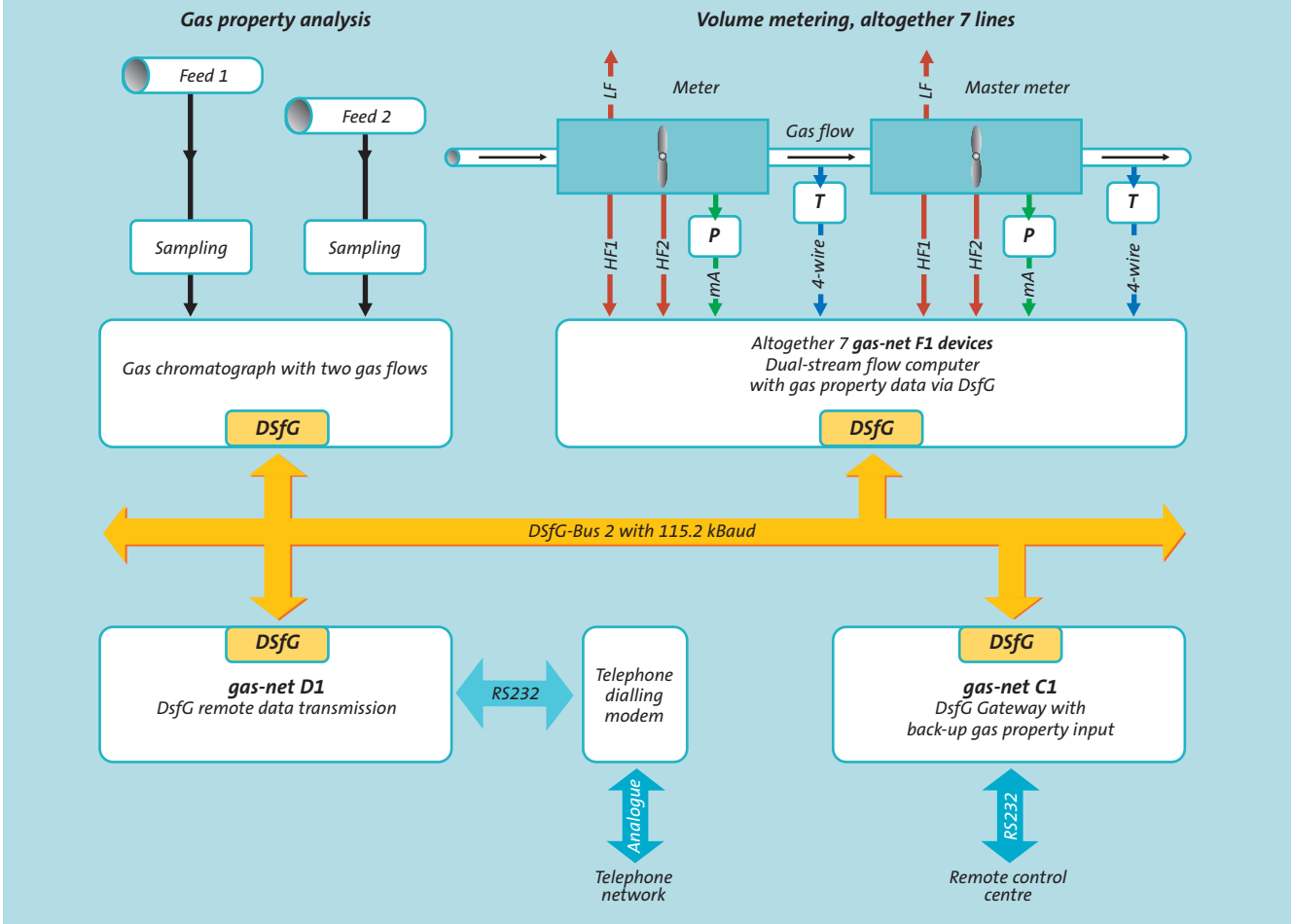
SWISSGAS AG was founded in 1971 in Switzerland and is involved in the exploitation and transport of natural gas. In 2004, the volume of natural gas extracted amounted to approximately 26,000 GWh. SWISSGAS AG operates six metering stations in which gas-net devices produced by Elster-Instromet Systems are used. Using the example of the Ruswil metering station, we would like to illustrate the variety of applications gas-net devices are suitable for.

The sleepy little town of Ruswil is situated around 20 km from Lucerne and, on account of its undisputable charm, is popular as a holiday destination. One of the highlights is without doubt the wonderful view of the mountains, in particular the Pilatus. However, the technically-minded visitor also gets good value for money, if they are interested in gas metering and they take a visit to the Ruswil metering station. It's hard to imagine that here you can find one of the most important metering stations belonging to SWISSGAS AG together with a Transitgas AG compressor station.

Structure of the plant

Natural gas from the Transitgas pipeline, which runs through to Italy, is fed into the Swiss high-pressure natural gas network via the metering station in Ruswil. The pipelines leading out of the station supply the central and western areas of Switzerland. The Ruswil station has two feed-in points for natural gas so that it is possible to switch between one of the two incoming pipelines located in the compressor station or the outgoing pipeline heading for Italy. As a result of this design, the properties of the gas vary depending on which feed-in pipe is selected. In the Ruswil station there are a total of seven metering lines. The maximum capacity is approximately 360,000 Nm³/h. Due to the large number of possible transport routes and metering lines, there are also a variety of control and regulating devices as well as monitoring and metering functions available. The fact that the metering station is permanently hooked up to the control centres of both SWISSGAS

Fig. 1: Principle of the gas metering technology in use at the Ruswil station



View of the gas measurement room

gas-net M1n message and monitoring unit

and Transitgas means that there is always the possibility of the remote control or monitoring of the system.

Gas metering

An overview of the principle of the gas metering technology in use can be seen in Figure 1. Basically, each of the metering lines is equipped with two turbine meters SM-RI in series. The meters each have two high-frequency pulsers from which the pulses are transmitted to the connected gas-net F1 flow computer, which is a standard 1/3 19" design. The corresponding pressure and temperature sensors are connected in the conventional manner. It should be stressed that the circuits for intrinsic safety of all of the sensor signals are already integrated, which is a standard feature of the gas-net devices. The gas-net F1 is a dual-stream flow computer and has the task of gathering actual data concerning the gas properties, which it receives via the DSfG-Bus 2 from one of the two gas chromatographs integrated into the plant. One of the special features of the gas-net F1 is the function which guarantees an automatic and smooth changeover to back-up data should there be any loss of primary data due to a failure of the gas chromatographs. This data comes from the Gateway gas-net C1, which is hooked up to the remote control centre.

Naturally, the flow computer also runs archives in compliance with DSfG standards and these archives keep a complete record of the metering over a period of more than three months. The turbine meters in operation are permanently compared to master meters thus guaranteeing the metering accuracy and quality of the lines.

The Gateway gas-net C1 is connected to the remote control centre via RS232 / 3964R and it logs into the 14 flow computer streams and the gas chromatographs approximately every three to four seconds and sends the current meter readings, pressures, temperatures, gas composition vectors and status information in real time to the control centre.

In addition to this, a DSfG-DFÜ gas-net D1 (DFÜ = remote data transmission) is connected to the DSfG-Bus and provides a helpful extra Bus access via the public telephone network in order to call up diagnostic and archive data and to make sure the officially recognised time is observed and all of the components connected to the Bus are synchronised.

Altogether there a total of 31 DSfG components, which means all of the available Bus addresses are in use. The typical reaction time to a gas-net C1 call-up procedure is between 0.2 and 0.3 seconds. As far as we know, the DSfG-Bus 2 in the Ruswil metering station is the only fully operational 115.2 kBaud DSfG data system.

Data collection

The basic structure of the data collection process is shown in Figure 2. The majority of the process values emanating from the station are registered with the help of six gas-net M1n devices, which are of a standard 1/2 19" design. One thing that has to be mentioned here is that there is the possibility to completely do without an external Ex-separation of the process signals. For this purpose, the devices are fitted with EX input cards of the type EXMFE5 and EXDE6. These enable the processing of:

- pressures and temperatures from a total of 15 HART sensors connected to 5 HART-Loops, each of which comprise 3 devices,
- valve, slide and SSV settings of a total of 72 end switches and NAMUR proximity switches,
- heating and operating temperatures of 2 PT100, four-wire sensors,
- low-frequency NAMUR pulses from 5 of the 7 turbine meters.

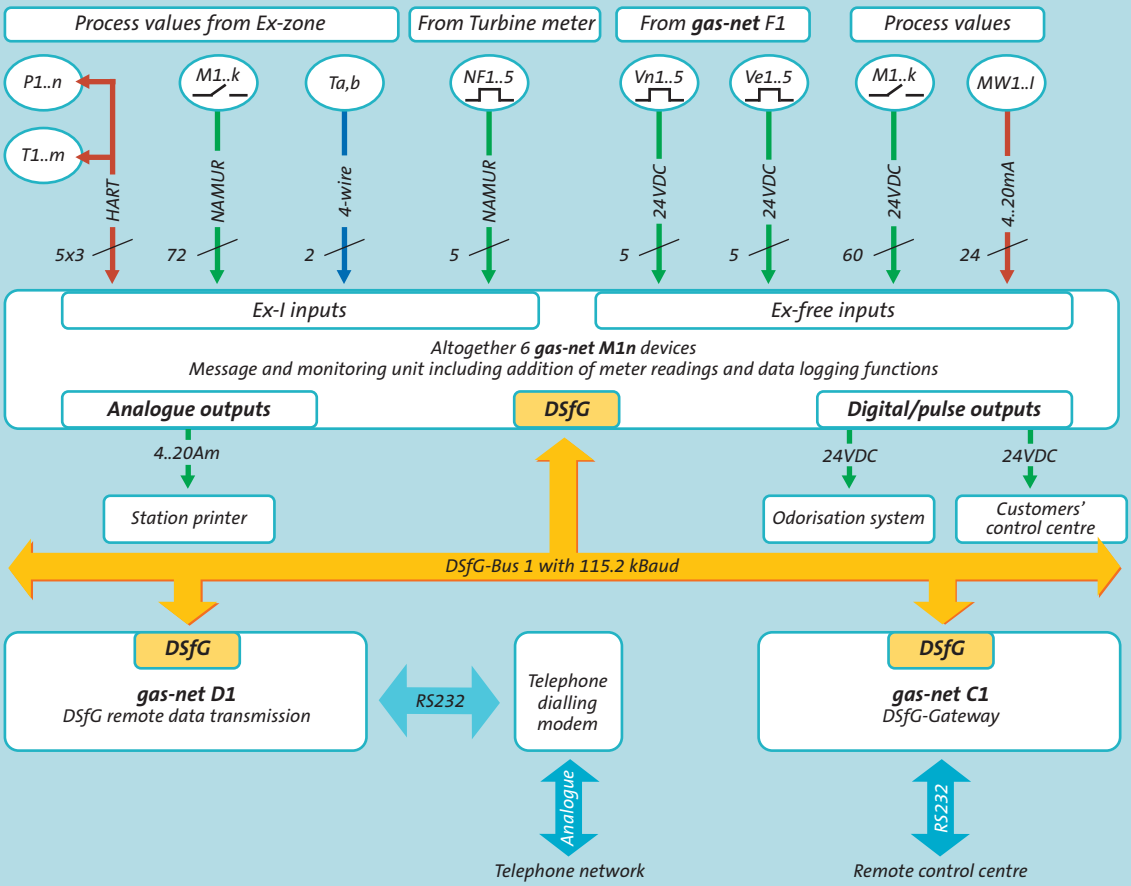
Additional intrinsically safe signals are registered in the form of:

- standard volume pulses (24V) from 5 of the 7 gas-net F1 devices,
- energy pulses (24V) from 5 of the 7 gas-net F1 devices,
- binary status signals (24V) from 60 alarm, warning, and limit control sources,
- various (altogether 24) 4..20mA signals with metering values.

The functions carried out by the gas-net M1n devices can be illustrated by mentioning a few highlights:

- the transmission of all metering values and messages via a 115.2 kBaud DSfG-Bus 1,
- the entry of alarms, warnings and events in log books which can be accessed via DSfG,
- the follow-up of drag pointers for metering values and their limit-check,

Fig. 2: Principle of the process data collection system at the Ruswil metering station



- the creation of meters which are operated by the actual volume pulses from 5 of the 7 turbine meters for the purpose of providing added security in the event of a failure in the data correction process,
- the reproduction of energy meters which are operated by the energy pulses of 5 of the 7 flow computers for the purpose of maintaining the integrity of consumption data in the event of a failure to access the DSfG-Bus 2,
- the addition of standard volume pulses from the flow computers for odorising purposes,
- the load-summation for the printout of analogue values on the station printer,
- the copying of pulses and analogue values for transfer to the customers' remote control systems and
- the creation of process archives.

In addition to the gas-net M1n devices, there is also a gas-net D1 DSfG-DFÜ device, which provides further access to the system via the public telephone network for the purpose of transmitting diagnostic and archive data and ensuring that the devices are synchronised as far as real time is concerned. The connection to the remote control system is effected via a Gateway gas-net C1 device. All metering data and messages are transmitted with a latent time of only 2 seconds.

Summary and outlook for the future

The SWISSGAS plant has proved to be highly successful in practice. The high availability and quality of the gas metering is achieved by implementing the appropriate monitoring procedures, which are made possible by the use of a total of 17 devices from the gas-net series. It has proved to be a particularly good idea to separate the gas metering from the process metering, which is expressed in the application of two DSfG Bus systems. We should not forget to stress that the field of application of DSfG is not restricted to gas metering but can also be stretched to include the fast and reliable collection of process data.

In the future we plan to increase the plant availability even more. In particular, the upgrade of the system components to enable the use of Ethernet communication looks promising. In this area, the use of the new Gateway gas-net C1n is an obvious step as it has an Ethernet interface via Modbus-TCP.

This all goes to show that Elster-Instromet Systems has once again made full use of its competence and high-tech know-how to provide a successful gas metering and data collection solution.

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