gas-net F1

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Electronic flow computer
for one, two or three streams
with integrated data logging function

Applications

The gas-net F1 is an electronic flow computer for natural gas. The device can be used to correct one to three streams depending on the version.

Brief information

AGA8-92DC, S-GERG-88 or AGA-NX-19 are available as correction methods.
The gas quality data may be parameterised as fixed values or supplied by a gas quality analyser connected via DSfG. Alternatively, a correction with a constant super compressibility factor K is possible.
The gas-net F1 also features an integrated data logging function.

Correction and data logging

The process interfacing of gas meters as well as temperature and pressure sensors of each gas stream is implemented via a multi-functional intrinsically safe input board (EXMFE5). An EXMFE5 board comprises three pulse inputs, [EEx ib] IIC, suitable for the connection of LF and HF pulse generators. Optionally, a transmitter for meter readings (ENCODER index) can be connected to the first channel.
The EXMFE5 input board provides a 4 – 20 mA process input for the conventional connection of the pressure sensor via the current interface. Alternatively, this input is suitable for the connection of up to four pressure and temperature sensors with HART interfaces (multi-drop).
In addition, the EXMFE5 input board is provided with an input for the connection of a Pt-100 temperature sensor using 4-wire technology.
Ultrasonic gas meters from various manufacturers can be connected to the gas-net F1 via communication interfaces, instead of using a pulse interface. In doing so, diagnostic information will also be transferred.
The volume correction function of the gas-net F1 determines the standard volume having passed through the unit, the gas mass and the energy based on the input values of operating volume, pressure and temperature as well as the gas quality.
In addition to its basic task, i.e. the correction, the device also monitors the measurement system for errors and malfunctions. Error listing and logbook facilitate an error analysis.
All gas-net flow computers feature a data logging function which records important measuring variables of the correction in defined intervals and in the case of errors.
The integrated data logging function can manage up to four process value archives with eight channels each for any measurements or meter readings in addition to the billing archives. Furthermore, it is possible to create a parameter change archive to be able to track all changes in system parameters.

Main features

- Compressibility calculations in accordance with AGA8-92DC, S-GERG-88, AGA-NX-19 or fixed K-factor. Live serial gas quality data via DSfG or MODBUS

- Alternative orifice meter calculation to ISO 5167-1

- Integrated data logging

- Additional alarm/error processing (max. 64 messages, max. 8 message groups)

- Memorized Min/Max functions for measured values

- Serial communication interfaces for Modbus ASCII and RTU, DSfG and other digital communication protocols

- Serial communication interface for modem and telephone

- Network TCP communication interface

- Expandable I/O boards , e.g. 4 status or pulse outputs and 4 (0/4 – 20 mA) current outputs on a multi-functional output board (MFA8)

- Time synchronisation via Modbus, a GPS receiver or via the network time protocol (NTP)

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General characteristics

Outputs:
Each gas-net F1 contains a multi-functional MFA8 output board for the output of messages, measurements and meter readings. This board provides one NC Photo-Mos output for messages, three PhotoMos outputs for messages or flow-proportional pulses as well as four analogue current outputs for measured values.

If the unit housing is wide enough, further gas-net input and output boards can be added.

Operation and display:
The gas-net F1 has 16 input keys, of which 12 numerical keys and 4 navigation keys. An illuminated LCD serves for data display. The intuitive operation of all gas-net devices via menus, similar to the Windows menus, can be learned easily.

All meter readings and important process values can be read off directly from the basic device display. In the case of multi-stream operation, the menu enables the operator to switch between the displays of the different streams.

Further menus can be invoked via the control panel. It is, for instance, very easy to track down and analyse the history of an event using the error list and logbook.

It is also possible to view all other archives using the control panel.
A three-coloured status LED shows at a glance which state the system is currently in. If the LED lights green, the correction process runs smoothly; if it lights or blinks yellow, this indicates a past or pending warning; if it lights or blinks red, this indicates a past or pending alarm (i.e. an error impairing the correction).

Additional functions

Elster-Instromet Systems devices are all-rounders which also provide many practical functions for perfect system monitoring.

The flow computer gas-net F1, too, comes up to this tradition.

Comparison of two flow computers: The F1 may query information of other flow computers via the DSfG interface, such as current meter readings or flow rates. Of course, the flow computers must all be connected to the same DSfG bus. Based on the data received, a meter comparison may be carried out for meters connected in series or appropriate values can be summed up for being transferred to outputs.

Signal processing:
The signal processing function of the gas-net F1 facilitates the comprehensive monitoring of signals and additional measurements.

This does not only concern the states of digital signal inputs. It is also possible to monitor any measurement reading and to initiate the generation of a message in case of certain events – for instance, if a value violates a set limit. To make the signal processing more efficient, several messages can be combined in message groups.

Skilful grouping of context-related messages significantly simplifies the comprehensive monitoring of the system. In this case it will be sufficient to observe the results of the message groups to get a quick overview of the system status. These so-called group or general messages can be relayed as signals via digital outputs or by DSfG telegrams.

Error listing and logbook of the signal processing then facilitate an analysis of the precise causes and the chronological development of the status signalled.

Integrated RDT:
The F1 features an integrated RDT function for remote data interfacing via telephone and modem as standard. In order to be able to use this function, you only need to connect a compatible modem (landline or GSM radio modem). Once the data link has been established, archives can be read out remotely, for instance, using the GAS-WORKS software developed to this end.

DSfG*:
In conjunction with the integrated RDT function, this means that even other devices connected locally via DSfG can be addressed via the telephone data link.

Communication interfaces:
The F1 is equipped with a DSfG interface so that several devices of the measurement system can be networked via the DSfG bus.

The unit's standard COM2 interface can be used to connect the gas-net F1 to a MODBUS system. If this interface is needed to connect the modem (integrated RDT function), however, optional MSER2 input boards can be supplied for MODBUS interfacing.

In addition, a network interface is available to enable DSfG remote call-up via TCP/IP. Data can also be transferred using the Modbus TCP/IP protocol

Central data extraction:
A data gateway of Type gas-net C2 allows central extraction of selectable data points for remote transfer using the local DSfG network of measuring instruments. In this process, both network and modem lines are supported.

Gas-net devices commonly use the field bus standard DSfG to exchange data with each other. DSfG is based on a highly recommended standard in Germany.
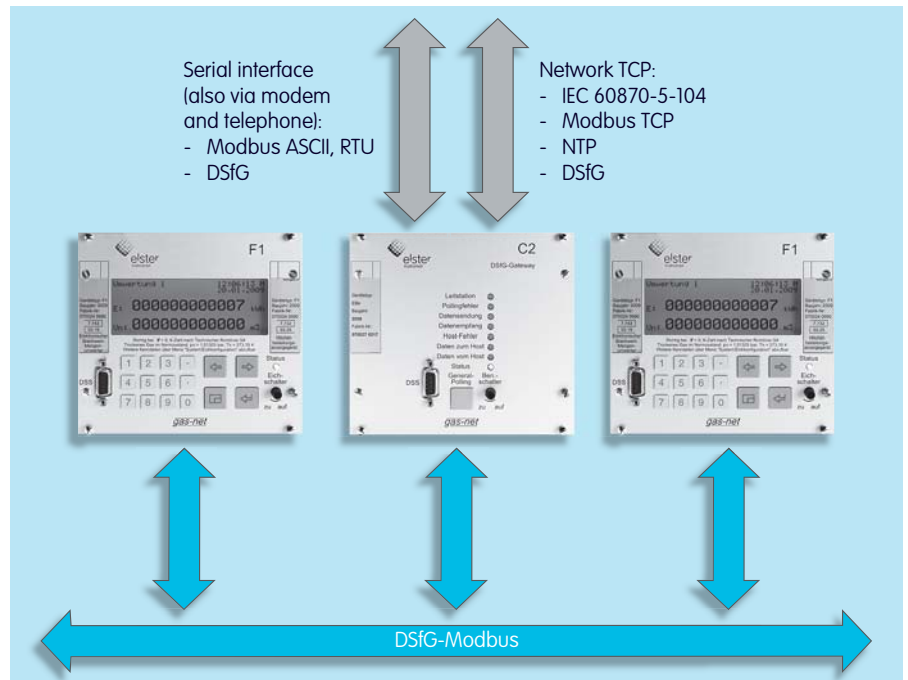
Locally networked gas-net devices

Software support by GAS-WORKS

The GAS-WORKS software suite provides the user with optimum support when operating gas-net devices.

The basic module, GW-BASE, manages all data present in a gas metering station (parameter data records, archive data, access data, etc.). In addition, various GAS-WORKS modules can be integrated in the GW-BASE environment.

The overview below presents all GAS-WORKS modules that are of interest when using the F1.

GW-GNET+:
Parameterisation and more:
The universal parameterisation program for all devices of the gas-net series is called GW-GNET+. The intuitive operation of this program can be easily learned. All parameters are combined in context-related groups and displayed in lists for further processing by the user interface. Context-sensitive help can be called up for each parameter explaining the function of the related setting.

A parameter data record can already be compiled in the office environment before the actual commissioning of the device. This reduces the on-site workload. The parameter settings can be transferred to the gas-net device via the DSS data interface

provided that the calibration switch is open.

Apart from the complete transfer of a parameter data record, individual parameters or parts of the parameterisation may be changed as long as a data link is established via parameterisation cables. Correction-relevant parameters are then protected by the calibration switch. It is only possible to change parameters that are protected by the user lock (one combination lock for each of the contractual parties) if the locks are open.

The audit trail records each change of the parameter settings in the device.

GW-REMOTE+:
Data communication and data transfer:
The GW-REMOTE+ program helps to establish a data link to any Elster-Instromet Systems device. This can be accomplished regardless of whether the device stands right in front of you and is connected to your computer by means of a parameterisation cable or whether you call a device installed in a remote system by telephone and modem. The GW-REMOTE+ user interface is set up identically in both cases and is very easy to operate.

GW-REMOTE+ offers the following functions for flow computers in particular as long as a data link exists:

- Display of the type label with general information on the connected device, current data*
- Remote operation by clicking the keys of the virtual control panel with the mouse.
- When using fixed gas quality values in the calculations, the values in the gas quality table can be modified remotely*
- Retrieval of all archives*
- Convenient freezing function for revision work*

* Also suitable for flow computers of other manufacturers, provided they support DSfG.

GW-DATA+:
Viewing of archive data:
The GAS-WORKS GW-DATA+ module edits archive data filed in GW-BASE and displays it to the user in clearly formatted tables.
In addition, the archived data can be presented in form of diagrams. This visualisation facilitates analysing the trend of measurements and meter readings.

Tip:
The basic module GW-BASE and the parameterisation program GW-NET+ are included in the delivery of each gas-net device. All other GAS-WORKS modules, which are available against a charge, can be installed in Demo mode from the GAS-WORKS CD and tested for 30 days with no obligation to buy.

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Technical data	
Housing	Plug-in unit in 19" design, 3 height units, 1/3 or 1/2 width for hinged frame mounting. Overall depth without plugs approx. 170 mm, with plugs approx. 220 mm. Process interfacing at the rear, control panel at the front. Versions with 1/3 overall width can take up to four process cards, versions with 1/2 width up to seven
Power supply	24 V DC +/- 20%, power consumption up to 12 W. Optionally: 230 V AC via external power supply unit
Ambient conditions	Temperature: 0 to +50 °C. Installation outside of Zone 2 hazardous areas only
Operation	16 input keys, of which 12 numerical keys and 4 navigation keys. Calibration switch
Display	Illuminated LCD, 8 lines with 32 characters each; status LED for indicating mains supply/alarm/warning
Process boards	Any 4 or 7 process boards listed below can be used, with the max. number depending on the housing width: EXMFE5 input board: - Three pulse or signal inputs, [EEx ib] IIC, of which one alternatively for an ENCODER index - Process input for sensors with a 4 – 20 mA output signal, [EEx ib] IIC, alternatively suitable for connection of up to 4 pressure and temperature sensors with HART interface (multi-drop) - Temperature sensor input for Pt-100 sensor incorporating 4-wire technology, [EEx ib] IIC Usually, one EXMFE5 is required for the process interfacing of each of the sensors needed for correction. MFE11 input board: - Eight digital inputs (common ground), which can either be used as 0/24 V DC signal inputs or as pulse inputs with a maximum input frequency of 20 Hz - Three 0/4 – 20 mA process inputs (common ground) MFA8 output board: - One PhotoMos output (NC, max. 28.8 V, 120 mA) for messages - Three PhotoMos outputs (NO, max. 28.8 V DC, 120 mA) for messages or pulses of up to 20 Hz - Four 0/4 – 20 mA analogue outputs for measurement readings (common ground) ExDE6 input board: - Six pulse or signal inputs, [EEx ib] IIC, of which one alternatively for an ENCODER index MSER2 serial interface board: - Two serial interfaces RS232/RS422/RS485 for connection of ultrasonic gas meters and interfacing to digital protocols
Pressure sensors	We recommend the use of the following pressure sensors: Rosemount, Types 2088 A / 2088 A Smart, 3051 CA, 3051 S FLOW COMP FCP 25 or FCP 25-2 Endress+Hauser Cerabar S PMC 731 or Cerabar S PMP 731
Data interfaces	DSS interface for connecting the device to the COM interface on a PC for parameterisation and reading out of archives Serial interfaces (COM2, MSER2) for connecting an ultrasonic gas meter, a landline or radio modem (GSM) or for other digital protocols (3964R, RK512, Modbus RTU, Modbus ASCII, Profibus DP). DSfG interface according to DVGW Code of Practice G485 and Technical Specification for DSfG Implementations, max. baud rate 115,200 baud Network interface for connection to TCP/IP based networks (DSfG Class B, Modbus TCP/IP, IEC 60870-5-104)
Data logging	Integrated data logging function for recording billing and operating data
Parameterisation	Commissioning and parameterisation using the GAS-WORKS PC software. The parameter data record can be stored, documented and managed in GAS-WORKS
German national type approval	TB approval symbol 7.743 03.15

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