

Productinformation

COMPACT GAS VOLUME CORRECTOR SYSTEM EC 900

Method of operation

Irrespective of pressure and temperature, a gas meter measures only the gas volume flowing through it, i.e. what is called volume at measurement conditions. Since gas can be compressed, the quantity of gas which has actually flowed through the gas meter still has to be calculated from the measured volume at measurement conditions (correction). As a measure for this quantity of gas, what is called volume at base conditions (related to the temperature at base conditions of 0°C and the pressure at base conditions of 1.01325 bar) is used. The EC 900 compact gas volume corrector carries out this conversion on the basis of the equation of state for ideal gases. Since this equation alone does not meet all the requirements for high-precision gas measurements, it is also necessary to take account of the characteristics of the real gas by using a correction factor, i.e. the K coeffi-cient.

The EC 900 system

The EC 900 system is mainly characterized by its versatility and its extensive communication functions. The device can basically be fitted with a fixed-line or radio modem. An external communication module is available for applications where a modem cannot be installed for reasons of explosion protection (Ex zone 1).

The EC 900 system comprises four different types of devices which are classified according to their ATEX approval (equipment for Ex zone 1 or 2) and type of power supply. The major differences of the four types are listed in the table below.

Fields of application

The EC 900 compact gas volume corrector is particularly suitable for use in small and medium metering stations where rotary piston meters or turbine meters are used for metering and no electrical equipment room with control cabinets is available. Such stations are often operated at points where gas is delivered to smaller municipal services or to commercial gas consumers.

The EC 900 can be installed and started up easily. It can be installed either directly on the gas meter, the wall or a stand or pipe. If it is ordered together with an RMG rotary displacement meter or turbine meter, the EC 900 can be delivered readily installed and parameterized.

The battery-powered version can process LF pulses of up to 10 Hz, while mains-operated devices can also be operated with HF pulses and thus enable the flow rate to be calculated. An encoder index can be connected to both versions.

Pressure and temperature transmitters

The pressure transmitter is fitted into the casing of the EC 900 as standard. There are 5 operating pressure ranges of up to 40 bar available. Connection is made via an M12 x 1.5 joint for Ermeto 6L pipes.
A PT 1000 with 4-wire connection is used as a tem-pera-ture transmitter, with a G¼" joint and variable face-to-face dimension (G½" and G¾" connections as options).

Differences of the 4 device versions			
Approval for use in Ex zones 1 & 2		Approval for use in Ex zone 2	
EC 911	Powered by an internal battery Volume pulses: reed or Wiegand	EC 921	Powered by 2 internal batteries Volume pulses: reed or Wiegand Internal modem
EC 912	Externally powered & emergency battery Volume pulses: reed, NAMUR or Wiegand Plus external communication module with - modem - interfaces (IR, RS 232, RS 422 / RS 485 / Ethernet) - 4 analog outputs - power pack	EC 922	Externally supplied & emergency battery for corrector Volume pulses: reed, NAMUR or Wiegand Internal modem 24 V or 230 V power pack

Features

• Approval for custody transfer metering

The EC 900 has been approved for custody transfer metering in compliance with the European Directive on Measuring Instruments (MID). Its maximum-load display function has been approved by PTB.

• Battery/mains-powered operation

The EC 900 can be operated by a lithium cell. Battery life is approx. 6 years with normal operation (input frequency below 1 Hz or use of Wiegand sensors).

The battery can be replaced without damaging a seal.

In the case of external power supply, it is even possible to use HF NAMUR transmitters.

• Calculation of the K coefficient

The EC 900 PTZ corrector calculates the K coefficient on the basis of one of the following methods:

- GERG 88S (standard)
- AGA-NX-19
- AGA 8 Gross 1

It is also possible to provide the K coefficient as a constant.

• Tariff-device function

Maximum and mean values of pressure and temperature, meter readings and events are recorded in com-pliance with requirements for use under legal control.

Furthermore, there is an additional data logger where the recording interval (1 minute up to 2 hours) can be individually chosen by the user.

• Explosion protection

Whether the EC 900 is battery-powered or supplied with 8.2 VDC, it is intrinsically safe and can be used in Ex zone 1. Devices with an integrated modem or another power supply can be used in Ex zone 2.

• Digital interfaces

The following digital interfaces can be used for exchanging data:

- 1 optical interface each on the corrector and the communication module
- 1 serial interface, configurable as RS 232 / 422 / 485 on the corrector
- Ethernet or USB interface (instead of a modem)

Available protocols: Modbus ASCII/RTU, DSfG-B

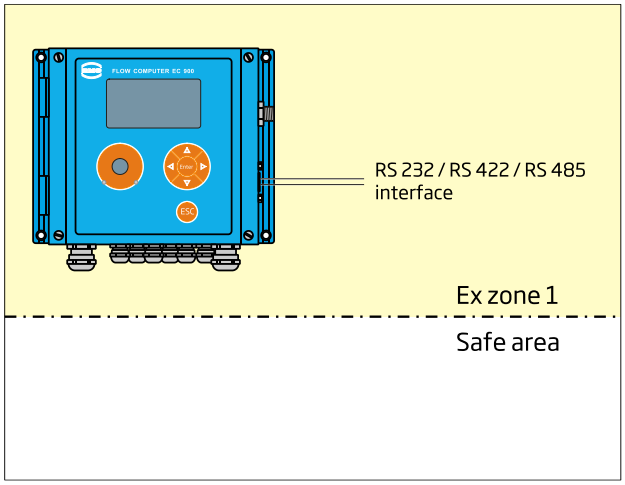
Archives and logbooks

The compact gas volume corrector has archives where measured data and events are recorded in compliance with the DSfG standard. These archives can be read out through one of the interfaces via Modbus or DSfG-B. There are the following archives:

- **Periodic archive** 4,442 entries
  If the measuring period is 1 hour (preset), the memory depth is sufficient for 6 months. The measuring period may be any value from 1 to 600 minutes.
- **Disturbance archive** 600 entries
  As the periodic archive, but it is filled only during the duration of a fault.
- **Daily archive** 731 entries
  An entry is made at the end of a gas day (adjustable).
- **Monthly archive** 24 entries
- **Event logbook** 600 entries
  The event numbers are stored.
- **Event archive** 600 entries
  Apart from events which are stored in clear text, current measured values and meter readings are stored.
- **Legal metrological logbook** 600 entries
  An entry is made every time a parameter under legal control is changed.
- **Parameter change archive** 600 entries
  An entry is made every time any parameter is changed.
- **Load archive** 600 entries
  As the periodic archive, but with its own time interval settable to a value from 1 to 120 minutes.

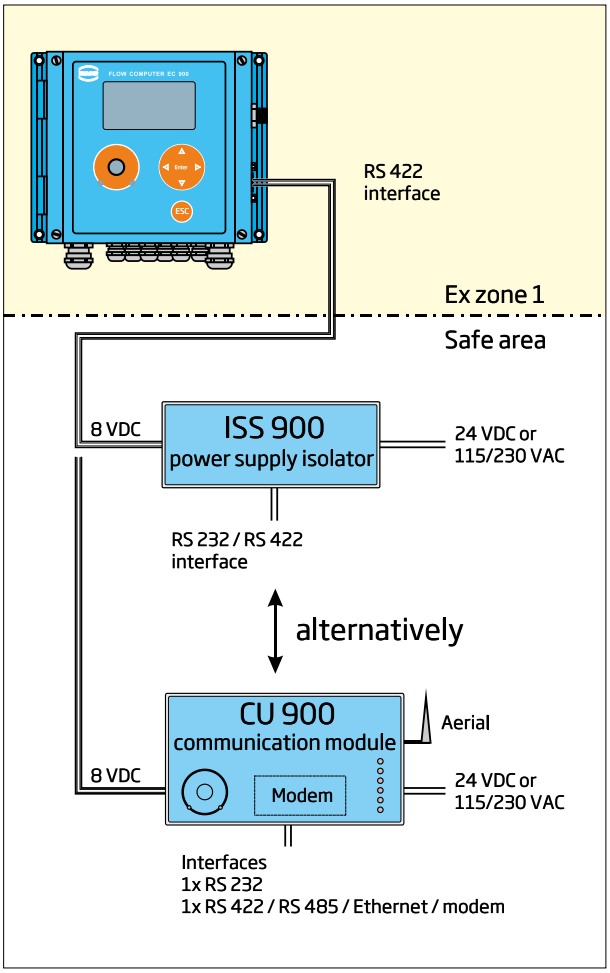
Every entry comprises the date and time of the occur-rence as well as the meter readings and measured values. In the logbooks, not only the time stamp is stored, but also the changes or event numbers. If the maximum storable number of entries for an archive or a logbook has been reached, the oldest values will be overwritten. This does not apply for the legal metrological logbook (as per PTB 50.7) where a message appears and further parameter changes can only be made after the calibration switch has been opened and the logbook entries have been deleted.

Type EC 911 (Ex zone 1)



The EC 911 version is exclusively supplied by a lithium battery and has been approved for Ex zone 1 as an intrinsically safe device.
The EC 911 has two volume pulse inputs (reed or Wiegand), one encoder input, one tamper alarm input, and six digital outputs.
The device has an optical interface and an electrical interface. The electrical interface can be configured as an RS 232, RS 422 or RS 485 interface using jumpers in the casing. RS 422 is the default configuration.
It is possible to upgrade the EC 911 to an EC 912 without any problem. However, it can only be converted into an EC 921 or EC 922 after the connection board has been exchanged.

Type EC 912 (Ex zone 1)



The EC 912 version has been approved for Ex zone 1 as an intrinsically safe device. The boards of the EC 911 and EC 912 are identical to each other; they differ in that the battery of the externally supplied EC 912 serves only as an emergency battery.
The EC 912 has two volume pulse inputs (reed or Wiegand), one encoder input, one tamper alarm input, and six digital outputs.
The device has an optical interface and an electrical interface. The electrical interface can be configured as an RS 232, RS 422 or RS 485 interface using jumpers in the casing. RS 422 is the default configuration. Connection to the ISS 900 or CU 900 via RS 422.
Depending on the power supply, there are different additional functions available:

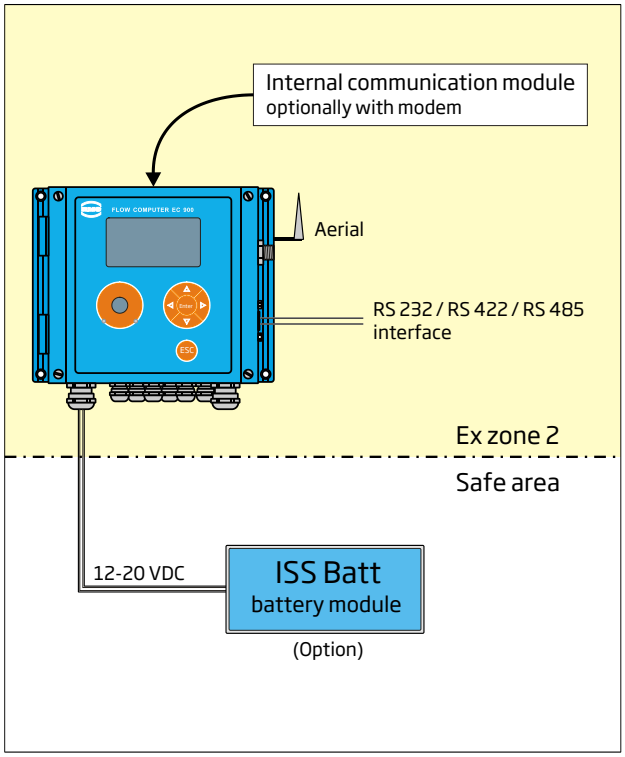
ISS 900 power supply isolator:

The connection to the EC 912 serves not only to power the device but also to transfer data. The serial interface is now available on the ISS 900 outside the Ex zone.

CU 900 communication module:

The serial interface is now available on the CU 900. There is also another electrical interface and an optical interface. The CU 900 can be fitted with a fixed-line or radio modem; alternatively, one of the interfaces can be configured as an Ethernet or USB interface. Furthermore, there may be up to 4 analog outputs.

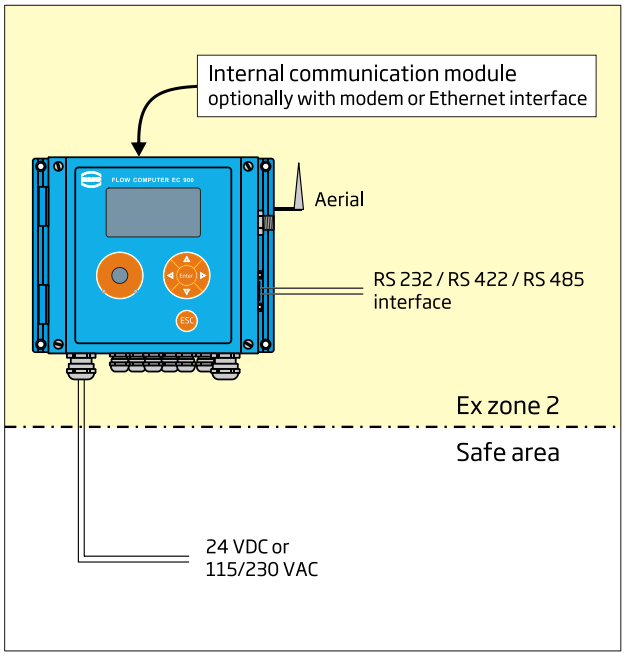
Type EC 921 (Ex zone 2)



The EC 921 version is intended for use in Ex zone 2; it is not permissible to operate this device in Ex zone 1. It is supplied by two lithium batteries as standard: one for the corrector and the other for the internal communication module.

The device has an optical interface and an electrical interface. The electrical interface can be configured as an RS 232, RS 422 or RS 485 interface using jumpers in the casing. RS 485 is the default configuration.
Apart from the fact that the external CU 900 communication module can also be fitted with current outputs (only in conjunction with the EC 912 device type), the internal and external modules have the same range of functions. So the communication module can be fitted with a fixed-line or radio modem. Alternatively, the "modem" socket provides another interface, e.g. Ethernet or USB.
Power can optionally be supplied by an external ISS Batt battery module. With this module, it is also possible to operate a GSM modem. This module is used for power supply only and has no interface.

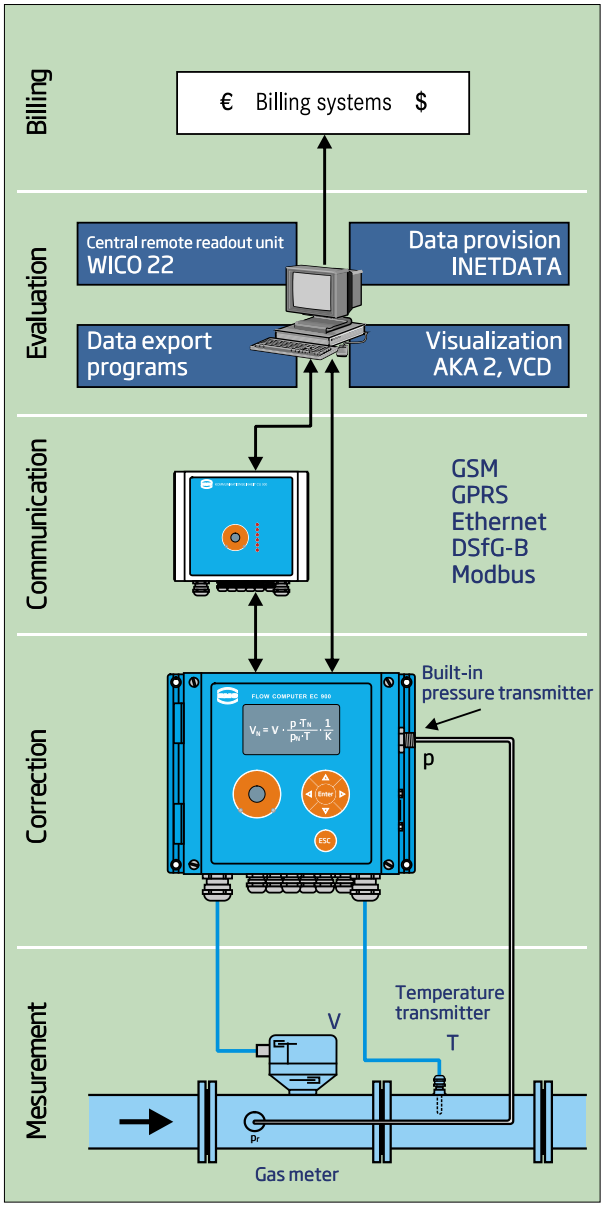
Type EC 922 (Ex zone 2)



The EC 922 version is intended for use in Ex zone 2; it is not permissible to operate this device in Ex zone 1. It is externally supplied and includes a power pack (24 VDC or 115/230 VAC). A lithium cell serves as an emergency battery to supply the volume corrector. However, it does not supply the internal communication module.
The device has an optical interface and an electrical interface. The electrical interface can be configured as an RS 232, RS 422 or RS 485 interface using jumpers in the casing. RS 485 is the default configuration.
Apart from the fact that the external CU 900 communica-tion module can also be fitted with current outputs (only in conjunction with the EC 912 device type), the internal and external modules have the same range of functions. So the communication module can be fitted with a fixed-line or radio modem. Alternatively, the "modem" socket provides another interface, e.g. Ethernet or USB.

Operation

Configuration data, archive entries, values measured and calculated and messages can be read from the 6-line LCD display. Navigation through the data is menu-prompted and can largely be carried out without using the manual. It is also possible to select up to 8 values for display which will appear together. So totalizers, pressure and temperature, for example, can be seen at a glance. Parameters can also be changed by pressing the relevant control buttons.



A much more convenient way of operating the EC 900 is by using the Dialog 900 program for reading out, parameterizing and visualizing data, which is supplied together with the device. This program can be used both locally and in the central unit. It is also suitable for operating the MRG 905 and MRG 910 measured-value recording devices.

Communication

Thanks to its versatile communication functions, the EC 900 can be integrated into the commonly used measuring and evaluation systems without any problem. Not only can RMG programs (see figure on the left) be used for evaluation, but the EC 900 can also be combined with other evaluation systems because of the standard protocols Modbus and DSfG-B.
The extensive event archive and the logbooks also provide comprehensive data for remote diagnosis from the central unit. Work in the central unit is facilitated by a feature enabling most parameters to be changed via a code number (without opening the calibration switch on site).

Accessories

- **CU 900 communication module** for supplying the EC 912; with electrical isolation for the serial interface and with an integrated modem.
- **ISS 900 power supply** isolator for supplying the EC 912; with electrical isolation for the serial interface.
- **ISS Batt battery module** for supplying the EC 921 device type.
- **Alternative supply units**
  - Solar module
  - Fuel cell
- **Infrared read head** as a transition between the optical interface and a serial electrical interface.
- **Interface isolating device** for battery-powered devices and devices in the hazardous area, for connection to the electrical interfaces.
- **Thermowells** for temperature transmitters, G¼" or G¾" connection threads.
- **Three-way check valve** for pressure transmitters.

Technical data

Correctors					
	for EC	911	912	921	922
Dimension (W x H x D):	160 x 160 x 80 mm	•	•	•	•
Protaction class:	IP 65	•	•	•	•
Ambient temperature range:	-25° to +55°C	•	•	•	•
Temperature at measurement conditions:	-20° to +60°C	•	•	•	•
Pressure range:	0.7 - 2 bar(a) 0.8 - 5 bar(a) 2 - 10 bar(a) 5 - 20 bar(a) 8 - 40 bar(a) 10 - 70 bar(a)	• • • • • •	• • • • • •	• • • • • •	• • • • • •
Power supply:	Lithium battery (3.6 V) 8 VDC (e.g. via ISS 900 or CU 900) 24 VDC or 115/230 VAC	•	•	•	•
Inputs:	1 volume input as LF input (reed/Wiegand), f_{max} = 20 Hz HF input (reed/NAMUR/Wiegand), f_{max} = 10 kHz 1 volume input for encoder 2 or 4 status inputs	 • • •	 • • • •	 • • •	 • • • •
Outputs	2 pulse outputs 2 digital outputs for status messages 2 additional digital outputs for status messages	• •	• •	• • •	• • •
Interfaces	1 optical interface 1 x RS 232/422/485 (switchable) 1 USB or Ethernet interface (instead of a modem)	• •	• •	• • •	• • •

Additional modules			
		ISS 900	CU 900
Power supply:	24 VDC oder 115/230 VAC	•	•
Outputs:	4 analog outputs 0/4 - 20 mA 4 digital outputs		• •
Interfaces:	1 optical interface 1 x RS 232 1 x RS 422/485 (switchable) 1 x RS 232/422 (switchable) 1 USB or Ethernet interface (instead of a modem)	 •	• • • •

RMG

ONE STEP AHEAD

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