

Gas Volume Corrector EC 24



PRODUCT INFORMATION

**Serving the Gas Industry
Worldwide**



by Honeywell

GAS VOLUME CORRECTOR EC 24

Method of operation, approval, options for combination

Method of operation

Irrespective of pressure and temperature, a gas meter only measures 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 meter still has to be calculated from the measured volume at measurement conditions. As a measure for the 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.

This conversion is made by the EC 24 volume corrector on the basis of the ideal gas law. Since this equation alone does not meet all the requirements for high-precision gas metering, it is also necessary to take the characteristics of the real gas into account by using a correction factor, i.e. the K coefficient.

The EC 24 volume corrector can be used for custody transfer and secondary metering in conjunction with turbine meters or rotary displacement meters. In the case of the EC 24, correction is based on the state variables of pressure, temperature and compressibility.

Approval

The EC 24 has been approved as a volume corrector for custody transfer metering of natural gases by the PTB.

PTB approval mark:

7.741
03.53

The specified limit values for custody transfer metering are monitored during operation. If these are exceeded, separate totalizers are used for metering the gas volume under disturbed conditions.

Options for combination

The volume corrector EC 24 can be combined with other gas meters in a multitude of variants. There are two basic combinations:

1. Installation on mechanical meters

The classic way to install a compact gas volume corrector is directly on the mechanical head of a turbine or rotary displacement meter (see description on page 6). Connection is to be made to the reed contact in the meter head

2. Electronic meters with a corrector feature

If the rotations of the turbine wheel are picked up by Wiegand sensors, no mechanical meter head is installed on the meter case, but instead an electronic meter head without a corrector feature or a volume corrector of the type EC 24. Possible combinations are listed in the table below together with the type description.

Gas meters without a corrector feature are described in separate publications.

GAS METER	ELECTRONIC METER HEAD	VOLUME CORRECTOR
Volumeter	TERZ 94 <i>Publication No. 3.174</i>	TEC 24 <i>page 6</i>
TRZ (standard)	TRZ 03-TE <i>Publication No. 3.163</i>	TRZ 03-TE / EC 24 <i>page 5</i>
TRZ (without inlet pipe)	TRZ 03-TEL <i>Publication No. 3.164</i>	TRZ03-TEL / EC 24 <i>page 5</i>

Features

- **Ease of installation and start-up**
If the EC 24 is ordered together with a RMG turbine meter, it can be delivered ready-installed.
- **Battery-powered or mains operation**
The standard design of the EC 24 is powered by two lithium cells. In normal operation (input frequency below 1 Hz with reed contact), the batteries have a lifetime of minimum six years and can be changed without opening the case.
- **Explosion protection**
The EC 24 is intrinsically safe and can be used in zone 1.
- **Calculation of the K coefficient**
The EC 24 volume corrector calculates the K coefficient in conformity with GERG 88S (product versions with AGA-NX 19 or AGA 8 Gross 1/2 are also available).
- **4-20 mA current output (transmitter)**
For designs with a current output board an external power supply unit is required (for devices located in areas subject to explosion hazards).
- **Data logger**
The monthly values and meter readings for the volume at measurement and base conditions, pressure and temperature are stored for a period of 14 months.
- **Digital interface**
A serial RS 485 interface with Modbus protocol is available for exchanging data.
- **Flow display**
In the case of electronic turbine meters with Wiegand sensors (and HF input pulses), the current flow rate value and the maximum value are displayed.
- **Two pulse outputs**
With reed contact: LF (Vm) and LF (Vb)
With Wiegand sensors: HF (Vm) and LF (Vm or Vb)
- **Fault message in the display**
- **Disturbing quantity totalizers**
- **Alarm output**
- **Connection of a tamper contact is possible**

Pressure transmitter and resistance thermometer

The pressure transmitter is installed in the case of the EC 24 by default. Special designs with an external pressure transmitter are possible.

The standard version is fitted with a resistance thermometer of the type PT 1000. In the case of mains-powered devices, it is also possible to use resistance thermometers of the types PT 500 or PT 100 (on request).

Operation

All configuration data as well as measured and calculated values are stored in an easy-to-survey table. All cells of this table can be reached and displayed by pressing two keys. Each value is shown with its corresponding unit

The parameters can be changed using internal keys or the supplied parameterization program. Parameters for custody transfer metering are protected by a sealable calibration switch, whereas all the other parameters are locked via a code number.

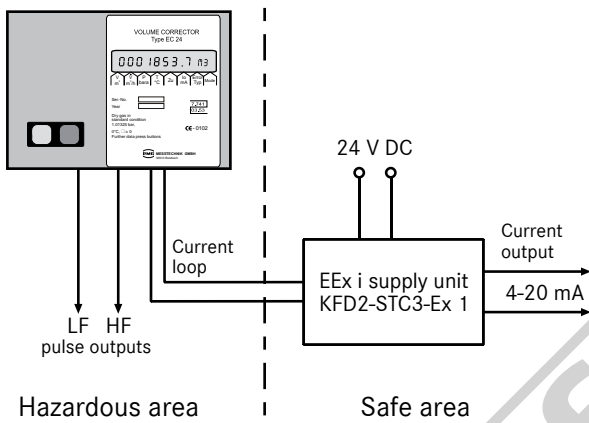
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Current output, data transmission

Current output (option)

If the device is operated with HF pulses (Wiegand sensors), a current of 4-20 mA can be outputted with an additional current output board. For this purpose, the volume corrector has to be externally supplied by a power supply unit.

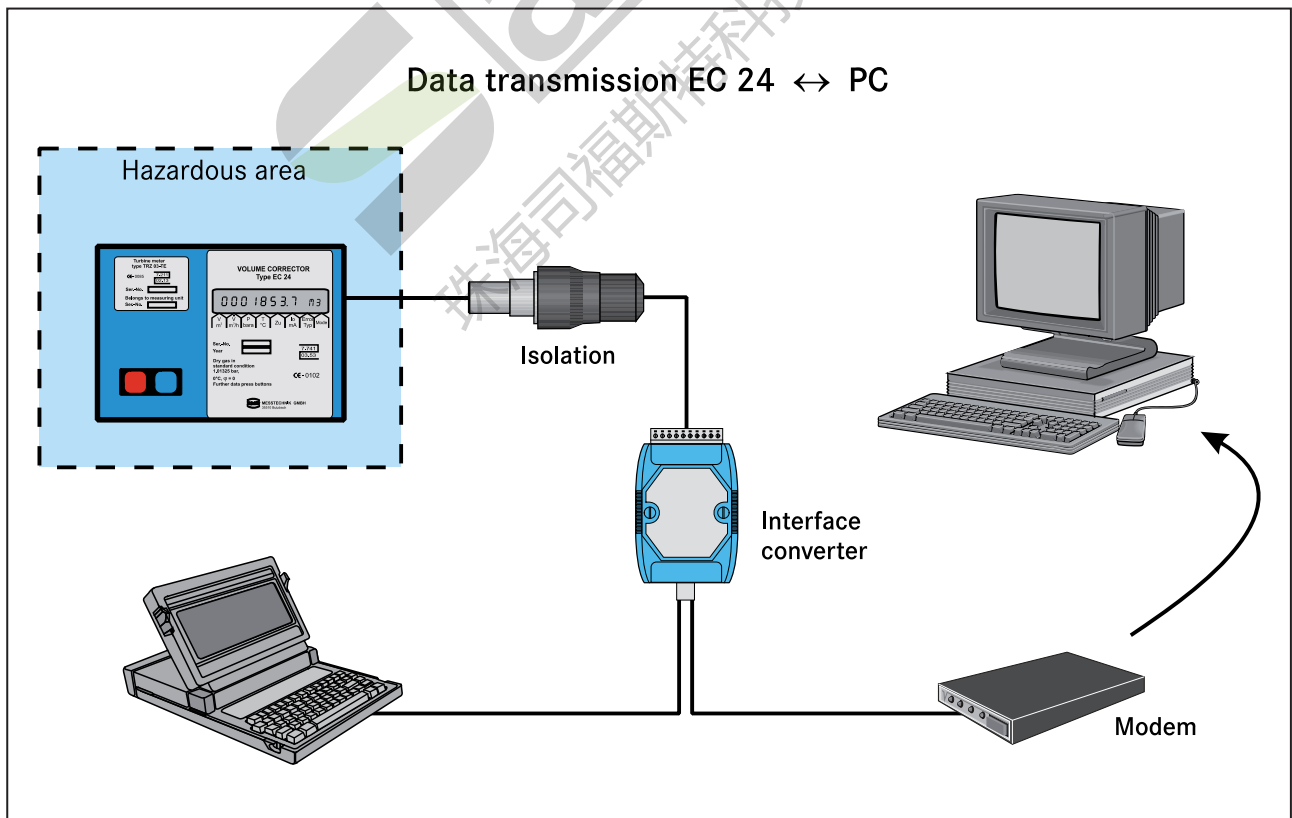
The EC 24 is fitted with a back-up battery as standby power supply by default. Via the current output, the flow rate at measurement or base conditions, or the pressure or temperature can optionally be outputted.



Data transmission

Using the RS 485 interface, data can be transmitted from the EC 24 to a PC on site or in the central station. For this purpose, only an interface converter to RS 232 (power pack required) or USB is required and an isolating module if the EC 24 is located in a hazardous area. Data are read out or parameterization is performed using a program which is supplied together with the device.

It is also possible to establish a connection to the central computer via modem. Remote programming of the EC 24 is then feasible and the K coefficient or gas quality data, for example, can be changed by the central station.



Electronic turbine meters / volumeters with a corrector feature

In connection with electronic turbine meters / volumeters with a corrector feature, the EC 24 volume corrector with its Vm display is simultaneously used as an electronic totalizer of the meter. The volume corrector is installed on a measuring element of the electronic turbine meter of the type TRZ 03-TE / TERZ 94. The type of the combination of TERZ 94 with EC 24 is TEC 24.

A permanent magnet is rigidly connected to the turbine wheel and its rotation is picked up by Wiegand sensors (TRZ 03-TE: 2 sensors, 2-channel measurement; TERZ 94: one sensor, optionally two). In this way, the electronic totalizing system receives HF volume pulses which are suitable for calculating the flow rate. In case of the turbine meter an alarm is released if the difference between the two measuring channels is too big.

The resistance thermometer, together with the two sensors, is located in a sensor sleeve which extends into the measuring element up to the permanent magnet.

The measuring element only has few mechanically actuated parts and thus is very low-wearing.

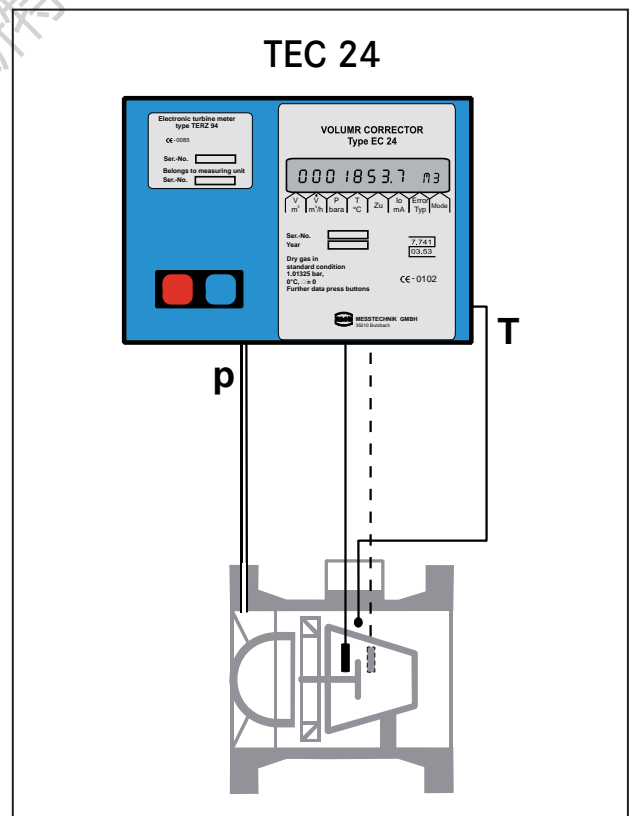
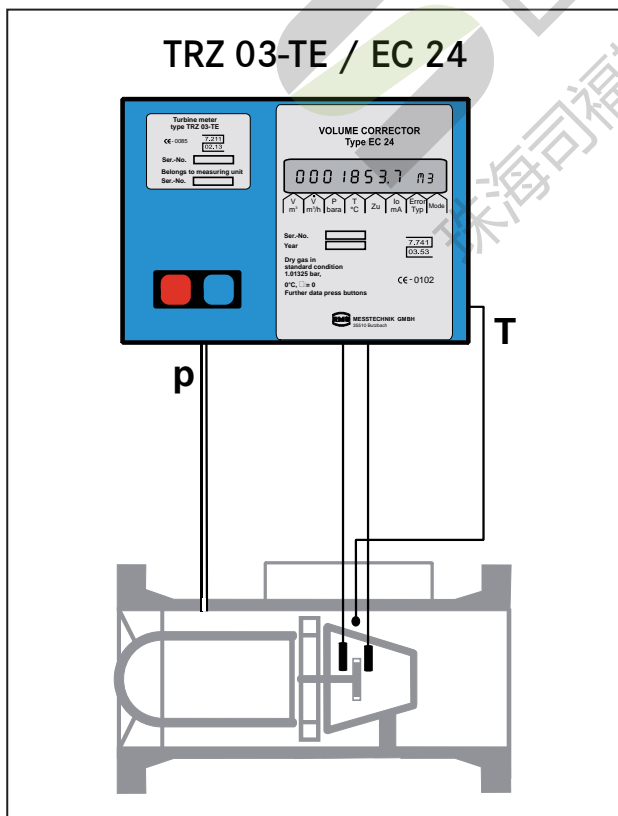
Since the TRZ 03-TE turbine meter has been approved by PTB for custody transfer metering, the combination TRZ 03-TE / EC 24 can also be used for custody transfer applications. Installation in the gas pipe is to be made with an inlet pipe of a length of 2 DN.

The measuring element of the electronic turbine meter TRZ 03-TEL can also be used for custody transfer metering. This gas meter has a perforated plate at its inlet and can be operated without an inlet pipe. Together with the volume corrector, the type designation is the following: TRZ 03-TEL / EC 24.

The TEC 24 can be used for secondary metering and its measuring uncertainty is less than 1%.

DESIGN	TURBINE METER	VOLUMETER
nominal diameter	DN 50 - DN 600	DN 25 - DN 600
pressure rating	up to PN 100/ANSI 600	up to PN 100/ANSI 600
measuring range	10 - 25000 m ³ / h	2,5 - 25000 m ³ / h

For the TEC 24 sandwich design is possible as well as flanged-end design.



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Mechanical gas meters in conjunction with the EC 24

Mechanical gas meters in conjunction with the EC 24

The EC 24 volume corrector can also be connected conventionally to mechanical gas meters:

- turbine meters for custody transfer metering, such as the TRZ 03 or TRZ 03-L;
- mechanical volumeters, such as the TRZ 03-K;
- rotary displacement meters, such as the RMG 132-A or DKZ 04;
- any other gas meters with LF pulse transmitters.

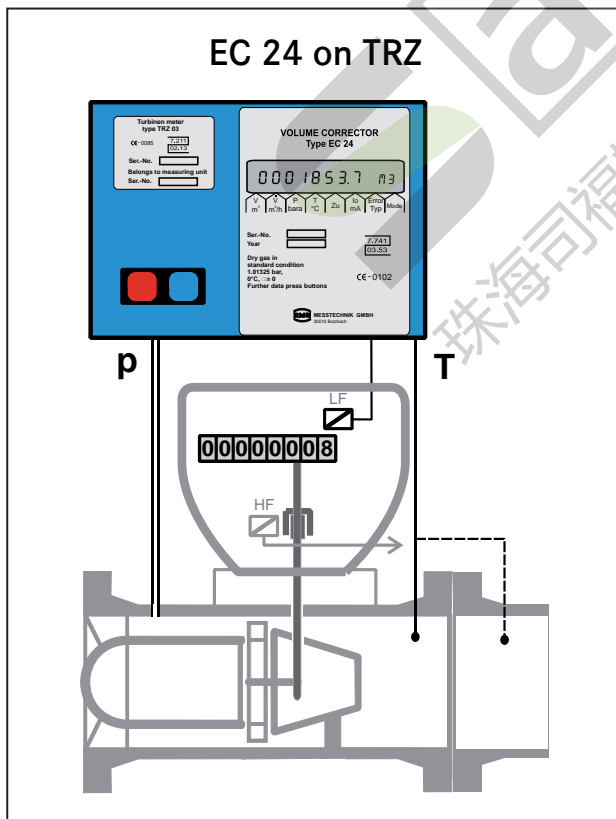
In the case of RMG gas meters, the easiest way to install the volume corrector is directly on the meter head using a bracket. Installation is even possible farther away from the meter up to a distance of 50 m and with the pipe from the pressure transmitter of the EC 24 sloping towards the meter.

If the volume corrector is installed on mechanical meters, an external temperature pick-up is used which is located in a thermowell on the meter or in the outlet pipe.

The reed contact in the mechanical head of the meter serves as a pulse transmitter. Operation is performed in the low-frequency range up to 1 Hz, and in this mode, the flow rate is not measured. Also the service life of the battery depends on the input frequency; it is longer if low frequencies are used.

1-channel measurement is usually sufficient - even for custody transfer metering - since there is a mechanical totalizer which can be simultaneously used as a "second measuring channel". However, 2-channel measurement is also possible.

There are two LF pulse outputs available; one of them outputs the unchanged input frequency (Vm) and the other one can be programmed for Vm or Vb.



Accessories

- **EEx i isolating module** for connecting a PC to the RS 485 interface of devices located in areas subject to explosion hazards
- **EEx i supply unit** for analog output, required for using the analog output of mains-powered devices
- **Isolating amplifier** for isolating the pulse outputs
- **Interface converter** for connecting a PC to the EC 24
- **Bracket** for fastening the device to an RMG turbine meter
- **Thermowells** for resistance thermometers, G $\frac{1}{4}$ " or G $\frac{3}{4}$ " threaded connections
- **Three-way check valve** for pressure transmitters

SPECIFICATIONS	
Explosion protection	II2 G EEx ib [ia] IIC T3/ T4
Case	cast aluminium case
Dimensions (L x W x D)	250 x 120 x 105 mm
Weight	approx. 1.5 kg
Degree of protection	IP 65
Ambient temperature range	-20°C to +60°C
Measuring temperature range	-20°C to +60°C
Resistance thermometer	PT 1000, 2-wire connection
Pressure ranges	0.7 - 2 bar (a) 0.8 - 5 bar (a) 2 - 10 bar (a) 4 - 20 bar (a) 8 - 40 bar (a) 14 - 70 bar (a)
Pressure transmitter connection	M12 x 1.5 coupling for ERMETO 6L (6mm pipe), an adapter is required for other cross sections
Distance of remote totalizer	max. 50 m
Power supply voltage	2 lithium batteries of 3.6 V each (service life > 6 years) or external 24 V/ DC power supply unit
Inputs	1 channel or 2 channels input pulses via reed contact with $f_{max} = 4$ Hz or input pulses from Wiegand sensor with $f_{max} = 400$ Hz
Outputs	<ul style="list-style-type: none"> • 3 transistor outputs: <ul style="list-style-type: none"> - HF (with reed contact: LF) for Vm - LF (programmable) for Vm or Vb - Alarm (fault) $U_{max} = 28$ V, $I_{max} = 60$ mA, $P_{max} = 420$ mW Connection via 7-pin circular connector <ul style="list-style-type: none"> • 4 - 20 mA analog output (only with external power supply), electrically isolated, load resistance max. 260 Ω
Interfaces	RS 485 (Modbus protocol) / external power supply

All outputs are protected against overvoltage.

For More Information

To learn more about RMG's advanced gas solutions, contact your RMG account manager or visit www.rmg.com

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