

# Flow Computer ERZ 2200



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Serving the Gas Industry  
- WORLDWIDE

## 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 meter has still to be calculated from the measured volume at measurement conditions. As a measure for this quantity of gas, what is called volume at base conditions (related to the relevant temperature at base conditions and the pressure at base conditions of 1.01325 bar) is used.

This conversion is made by the ERZ 2200 flow computer 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 metering, it is also necessary to take account of the characteristics of the real gas by using a correction factor, i.e. the K coefficient.

RMG's ERZ 2200 flow computer can be used for custody transfer and secondary metering in conjunction with all gas meters, such as

- turbine meters
- vortex meters
- ultrasonic flowmeters
- rotary displacement meters, etc.

The following two designs are available:

### 1. Gas volume corrector (type ERZ 2200-004)

As a gas volume corrector, the ERZ 2200 calculates the volume of the metered gas at base conditions.

### 2. Superior calorific value corrector (type ERZ 2200-104)

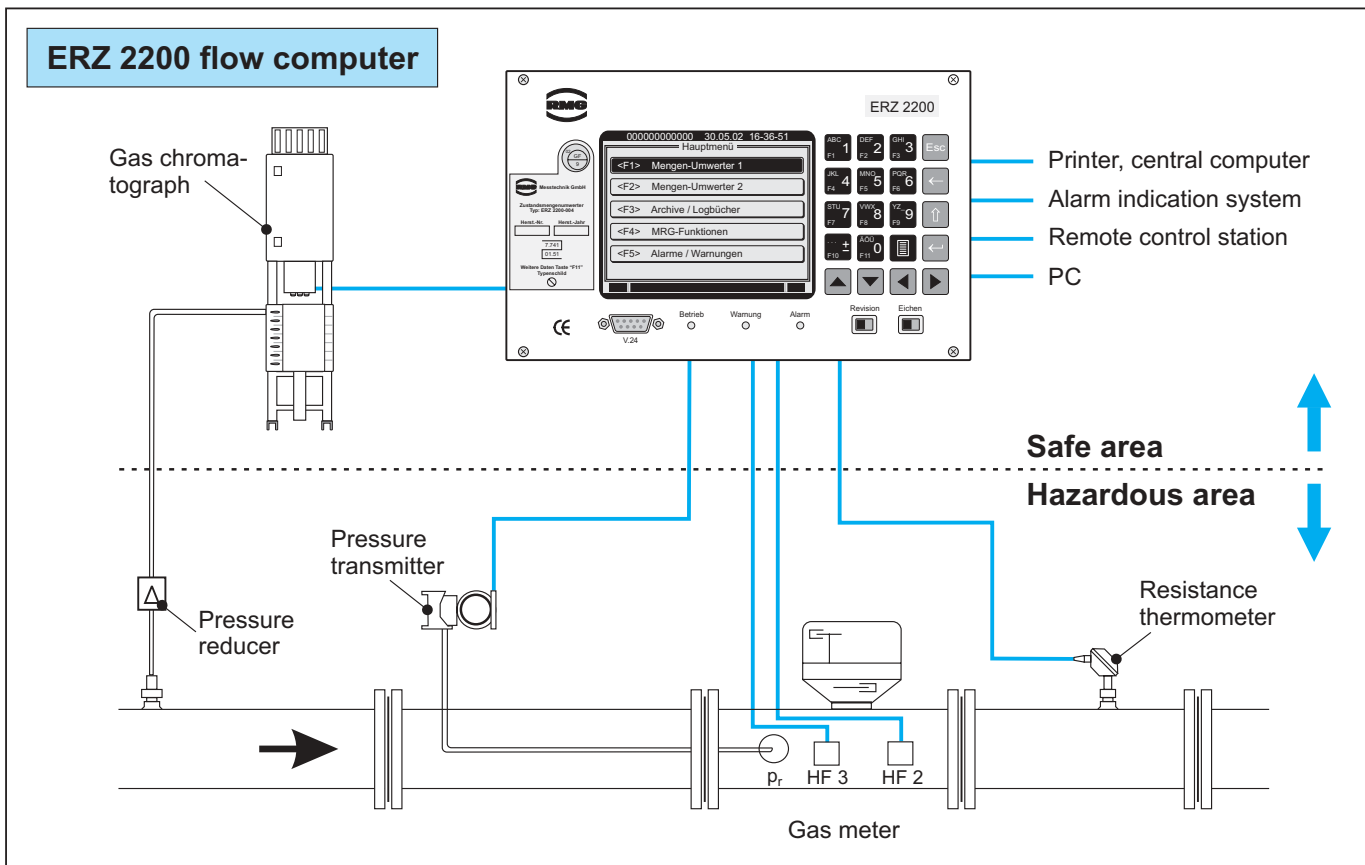
As a superior calorific value corrector, the ERZ 2200 calculates not only the volume at base conditions but also the energy content of the metered gas. For this purpose, it is necessary that a superior calorific value measuring device (e.g. a process gas chromatograph) provides the current superior calorific value.

## Approval

The ERZ 2200 has been approved as a gas volume corrector and superior calorific value corrector for custody transfer metering of natural gases. The approval numbers are as follows:

ERZ 2200-004: PTB 7.741/01.51  
ERZ 2200-104: PTB 7.743/01.14

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



## Features

- **Remote parameterization is possible**  
The parameters of the ERZ 2200 can be changed via Modbus and remote data transmission by a PC in the central station. With operating data, first the code number has to be sent, while with calibration data, the calibration switch of the device has to be enabled.
- **Original meter readings**  
With gas meters with an electronic totalizer, it is possible to transmit meter readings digitally to the ERZ 2200 and so the original meter reading is then available in the corrector.
- **Digital inputs for measured values**  
Alternatively to the analog transmission of measured values from pressure transmitters and resistance thermometers, the values can also be transmitted digitally in conformity with the HART protocol.
- **Data-logging feature**  
The ERZ 2200 includes a data logger recording the data which are generated in the corrector and read out via the Modbus interface.
- **Freezing measured and calculated values**  
Measured and calculated values can be stored manually or automatically (at regular intervals) in the memory.
- **Calculation of the K coefficient**  
The ERZ 2200 flow computer calculates the K coefficient of natural gases. For this purpose, the following methods can be chosen:
  - GERG 88S
  - AGA-8
  - Beattie-Bridgeman (on request)It is also possible to specify the K coefficient as a constant.
- **Bus interface**  
The device has a Modbus interface (RS 485) as standard which is suitable for exchanging custody transfer data between the devices of different manufacturers.
- **Error curve linearization**  
During high-pressure testing of a gas meter, its error curve, which depends on the flow rate, is determined. This error curve can be simulated in the ERZ 2200 gas volume corrector and thus the error of measurement can be corrected.
- **Line switching**  
It is possible to add up the quantities for two lines on different totalizers (e.g. when storing gas in an underground storage facility or taking it from there).

## Gas analysis

If there is a gas analyzing device available, the analytical result can be transmitted to the ERZ 2200 flow computer via the Modbus interface. In this way, the current gas composition will be used to calculate the K coefficient and the energy content in each case.

## Isolation of signals from hazardous areas

Isolating amplifiers for volume pulse inputs are installed in the case as standard and enable an intrinsically safe gas meter to be connected. The switching threshold and hysteresis are adjusted automatically but can also be set manually using the keyboard.

## Display and operation

The graphical LCD display field enables measured values and operating parameters to be displayed in an easy to survey tabular format. The most important measured values for each corrector can be shown in a single overall table. The data stored in the data logger are also displayed graphically.

Thanks to an easy to operate and convenient menu control system, all values can be reached in general without consulting the manual. The ERZ 2200 detects all inserted cards and automatically adapts the menu to the relevant hardware configuration.

Programming can be done either via the keyboard of the device, the digital interface on the front panel or the Modbus. Parameters which are relevant for custody transfer metering are protected by a sealable switch, while all the other parameters are protected by a code number.

## Resistance thermometer

| Type                  | Rosemount PT 100 / W-GYI<br>Resistance thermometer as per DIN 43760                 |
|-----------------------|---|
| Explosion protection  | EEx-d IIC T6 (explosion-proof enclosure)  |
| Gas temperature range | -20°C to +60°C (for custody transfer metering*)                                     |
| Measuring error       | < ±0.1% of the measured value   |
| Overall lengths       | 160 mm (standard)<br>250 mm (option)<br>400 mm (option)                             |
| Process connection    | G $\frac{3}{4}$ " integral thread   |
| Maximum pressure      | 100 bar   |
| Electrical connection | 4-wire connection,<br>M20 x 1.5 wire feed-through,<br>6.1 to 11.6 mm cable diameter |
| Degree of protection  | IP 65   |

\* Temperature range for secondary metering: -50°C to +550°C

The PT 100 resistance thermometer has been approved for custody transfer metering. It can be used either directly in the fluid or in a sensor pocket. The PT 100 resistance thermometer can also be used in conjunction with other RMG gas volume correctors.



PT 100 Ex (d)  
resistance thermometer

## Pressure transmitters

| Type                               | Rosemount 2088 A  | Rosemount 3051 CA             |
|------------------------------------|---|-------------------------------|
| Measuring ranges<br>(bar absolute) | 0.9 – 4.5   | 0.9 – 4.5                     |
|                                    | 2 – 10  | 2 – 10                        |
|                                    | 3 – 15  | 3 – 15                        |
|                                    | 4 – 20  | 4 – 20                        |
|                                    | 6 – 30  | 6 – 30                        |
|                                    | 10 – 50   | 10 – 50                       |
|                                    |   | 14 – 70                       |
|                                    |   | 20 – 100                      |
| Measuring error                    | ≤ 0.3% of the measured value  | ≤ 0.25% of the measured value |
| Weight                             | approx. 0.9 kg  | approx. 2.5 kg                |
| Explosion protection               | EEx-d IIC T6 (pressure-proof enclosure)                                     |                               |
| Ambient temperature                | -10°C to +40°C (for custody transfer metering)                              |                               |
| Process connection                 | Ermeto coupling (6 mm)  |                               |
| Electrical connection              | 2-wire connection,<br>½" NPT wire feed-through,<br>6 to 8 mm cable diameter |                               |
| Degree of protection               | IP 65   |                               |

The pressure transmitters 2088 A and 3051 CA have been approved for custody transfer metering and can also be used in conjunction with other RMG gas volume correctors.



Rosemount 2088 A  
pressure transmitter



Rosemount 3051 CA  
pressure transmitter

## Construction

The ERZ 2200 has a modular structure and can be adjusted to suit various operating conditions. The base unit comprises the CPU, RAM and Modbus interface. It has six slots for corrector or input/output cards. One or two corrector cards can be inserted here so that the ERZ 2200 can be used for two gas meters.

Thanks to the data memory feature of its base unit, the device can also be used as a data logger for measured values. Not only can the measured values and meter readings from the inserted corrector cards be stored, but also those of another two external gas volume correctors and a process gas chromatograph. The data can be transmitted via the Modbus or by analog transmission. With analog transmission, however, additional input cards are required.

The remote data transmission (RDT) feature can also be integrated into the case. Then there are only three free slots left and only one gas meter can be connected. If the RDT feature is not fitted into the case, it can be connected to the base unit via a fast data channel. In this way, the stored data can be called from the central station.

## Data logger

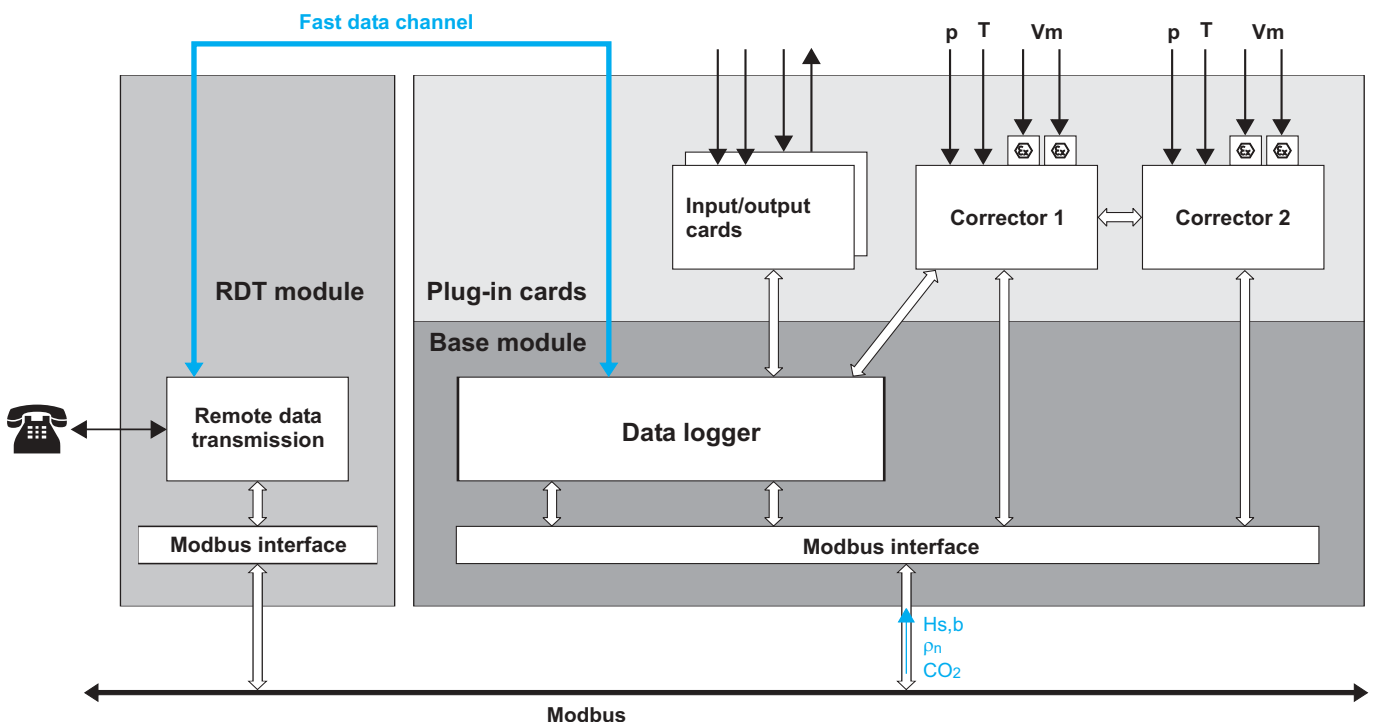
The following quantities and messages can be stored by the integrated data logger:

- fault messages
- events
- input/output signals
- meter readings
- hourly, daily and monthly values
- maximum / minimum values
- mean values calculated in the device
- measured values
- date and time
- log.

With hourly recording and troublefree operation, the memory depth for measured values and meter readings is 85 days. In addition, up to 200 events can be recorded.

The entries can be either read from the display field or read out using an RMG program. For measured values, also graphical daily overviews can be displayed by the device.

In the case of a power failure, all data will be preserved for at least one year.



Configuration with external remote data transmission

## Plug-in cards

In order to customize the device, there are slots for expansion cards available. The cards can be combined in almost any way and their maximum number is limited by the six slots available. Please note: Only a maximum of two corrector cards can be inserted and some cards use more than one slot.

### Corrector card

The corrector card uses two slots and provides all inputs and outputs for volume correction. Optionally, the corrector card can be fitted with isolating amplifiers for the volume inputs. These isolating amplifiers can be adjusted manually or automatically.

### Binary input/output card (10 channels)

The binary input/output card occupies one slot and provides eight function inputs in order to initiate the following actions externally:

- line switching
- switching between H and L group gases
- freezing measured values.

With the first card, the remaining two channels can be individually configured as pulse or message input or as signal output. With any further card which is inserted, all 10 channels can be configured.

### Analog input card (8 channels)

This input card uses one slot and has eight current inputs (0/4-20 mA) which can be transformed into voltage inputs using jumpers.

### Analog input/output card (8/2 channels)

This input/output card occupies one slot and has eight current inputs (or voltage inputs, see above) and two current outputs (0/4-20 mA in each case).

### Analog output card (10 channels)

This output card uses one slot and has 10 electrically isolated current outputs (0/4-20 mA) or binary outputs of which two can also be configured as frequency outputs.

### Remote data transmission (RDT) unit

A permanently installed RDT unit which occupies three slots turns the ERZ 2200 into a compact device which provides all the features required for measuring stations with a gas meter.

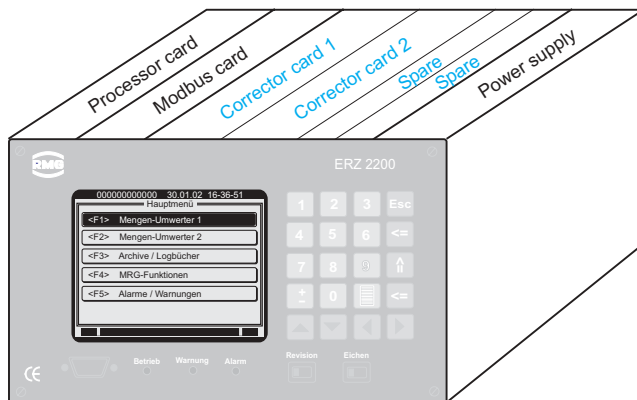
### Read-out and parameterization software

The WISERV service program is available to read out and parameterize the ERZ 2200. Data can be accessed via the front interface (local version) or via remote communications by the central computer (RDT version). This enables instantaneous data and memories to be read out and the data can be stored in Excel format. Access is also possible in write mode to change fixed gas quality data, for example.

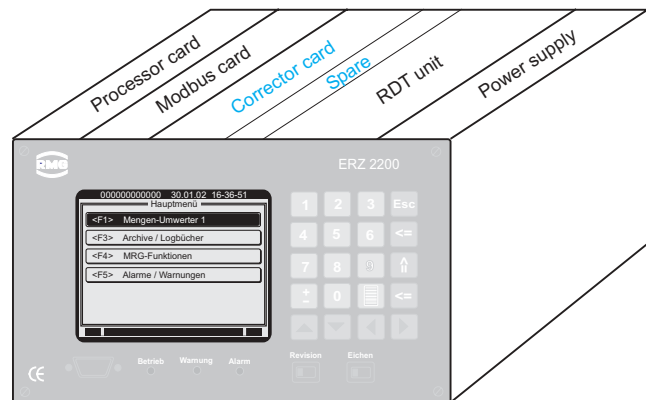
### Accessories

- **19" rack** to accommodate a maximum of two ERZ 2200 rack-mounting units.
- **Interface distributor** for installation in 19" racks to interconnect the interfaces of a maximum of five users.
- **Thermowells** for resistance thermometers.
- **Thermal insulation** for resistance thermometers.
- **Three-way check valve** for pressure transmitters.

## Examples of assembly



Design for two gas meters

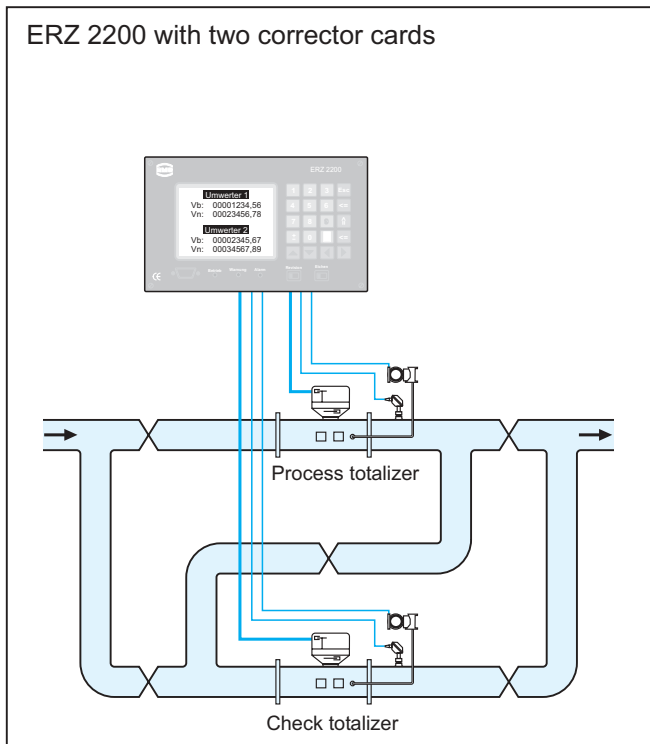


Compact design with remote data transmission

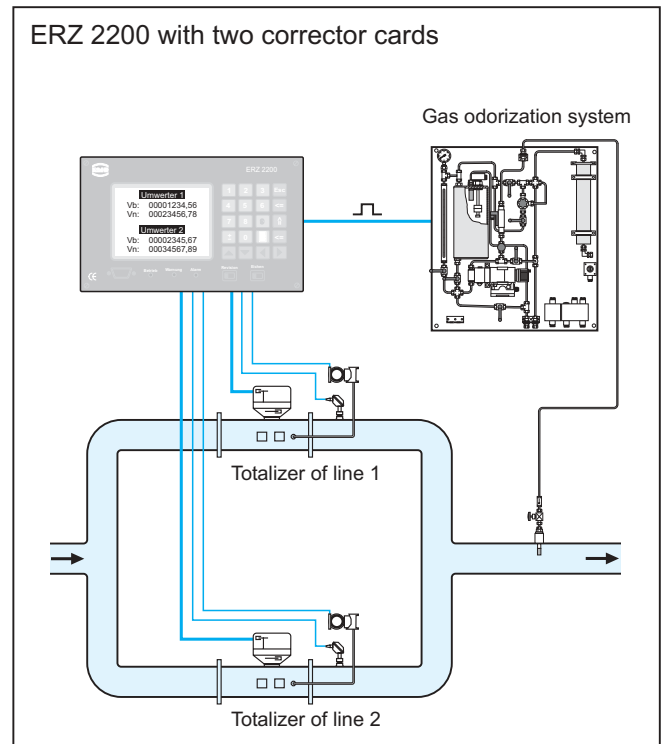
## Examples of application

Four examples out of a variety of possible configurations.

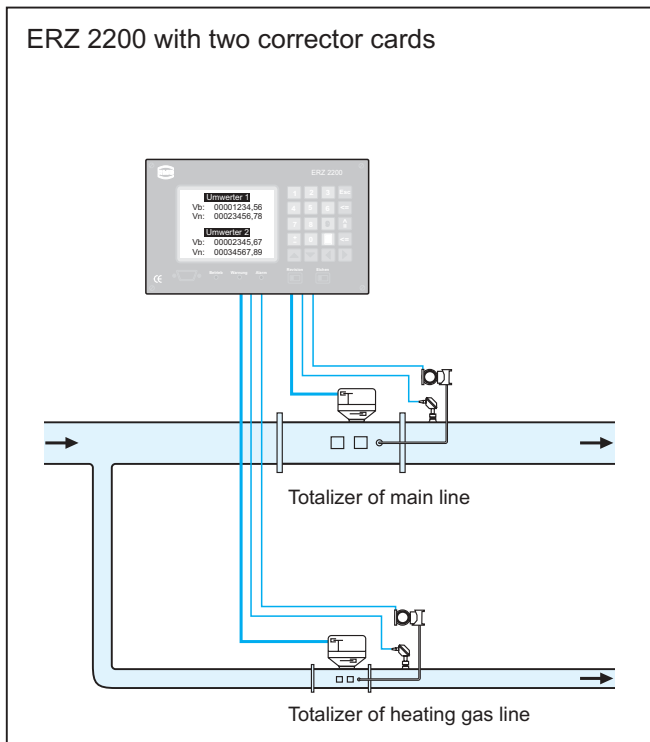
### Meter test arrangement



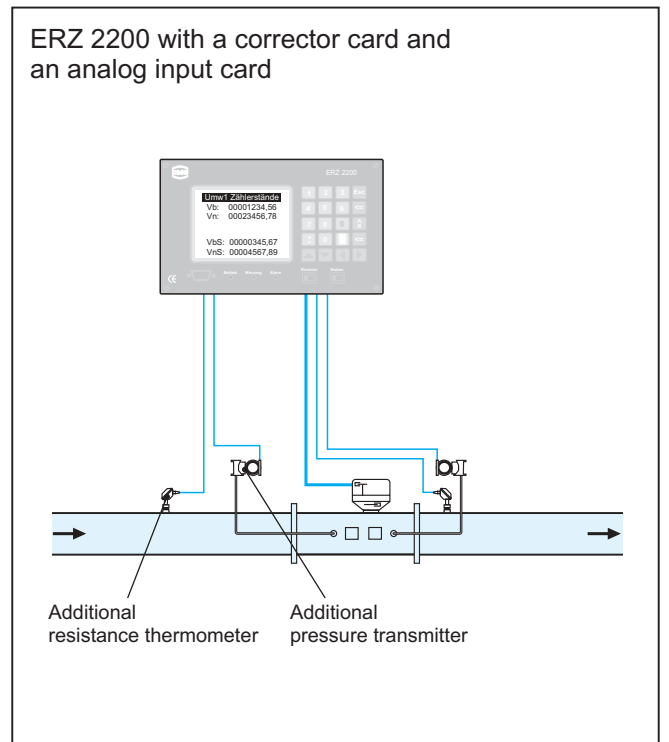
### Totalizing for odorization control



### Measuring and heating lines



### Recording additional measured values



# Flow Computer ERZ 2200

## Specifications

|                                  |   |
|----------------------------------|---|
| <b>Base module</b>               |   |
| <b>Power supply voltage</b>      | 24 V/DC -10%/+15%   |
| <b>Power input</b>               | 24 W  |
| <b>Ambient temperature range</b> | -20°C to +60°C  |
| <b>Dimensions</b>                | W x H x D = 213 x 128.4 x 310 mm (42 depth units / 3 height units)  |
| <b>Weight</b>                    | 3.8 kg  |
| <b>2 relay contacts</b>          | $U_{max} = 30 \text{ V}$ $I_{max} = 100 \text{ mA}$ $P_{max} = 150 \text{ mW}$  |
| <b>Interfaces</b>                | Front panel RS 232 C / V24 for portable PC (notebook computer)<br>Rear panel RS 485 for Modbus<br>RS 232 C / V24 for direct data channel for RDT<br>RS 232 C / V24 modem dialog interface |

|   |  |
|---|--|
| <b>Corrector cards</b>  |  |
| <b>2-channel volume input</b>                                 | $f_{max} = 20 \text{ kHz}$ , with isolating amplifier: 5 kHz                                 |
| <b>4 current inputs</b>                                       | 0/4-20 mA (2-wire connection) for pressure transmitter and resistance thermometer            |
| <b>1 resistance input</b>                                     | for resistance thermometer (4-wire connection)   |
| <b>4 current outputs</b>                                      | 0/4-20 mA, user-programmable<br>load resistance: max 500 $\Omega$ , $U_{max} = 10 \text{ V}$ |
| <b>4 pulse outputs</b>  | $U_{max} = 30 \text{ V}$ $I_{max} = 100 \text{ mA}$ $P_{max} = 150 \text{ mW}$               |
| <b>Explosion-protection class</b><br>(isolating amplifier)    | II (2) G [Ex ia] IIC   |
| <b>Explosion-protection approval</b><br>(isolating amplifier) | TÜV 00 ATEX 1606 X   |

|                                |   |
|--------------------------------|---|
| <b>Input/output cards</b>      |   |
| <b>Function inputs</b>         | $I_{max} = 10 \text{ mA}$ , $U_{max} = 15 \text{ V}$                                |
| <b>Pulse or message inputs</b> | $f_{max} = 10 \text{ Hz}$ , $I_{max} = 10 \text{ mA}$ , $U_{max} = 15 \text{ V}$    |
| <b>Pulse outputs (passive)</b> | $U_{max} = 30 \text{ V}$ , $I_{max} = 20 \text{ mA}$                                |
| <b>Current inputs</b>          | 0-50 mA,      load: 500 $\Omega$  |
| <b>Voltage inputs</b>          | $U_{max} = 50 \text{ V}$ , $R_i = 1 \text{ M}\Omega$                                |
| <b>Current outputs</b>         | 0/4-20 mA, $U_{max} = 10 \text{ V}$ ,      load: 500 $\Omega$                       |
| <b>Binary outputs</b>          | $U_{max} = 30 \text{ V}$ , $I_{max} = 20 \text{ mA}$                                |
| <b>Frequency outputs</b>       | $U_{max} = 30 \text{ V}$ , $I_{max} = 20 \text{ mA}$ , $f_{max} = 28.8 \text{ kHz}$ |

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