



Electronic Devices  
and Systems

**EK-87**  
**Electronic Volume**  
**Corrector**



**This product is discontinued!**

## EK-87 electronic volume corrector



- **System volume corrector including integrated data storage device for collecting performance data**
- **Data storage for billing purposes**
- **For use with all gas meters with low or high-frequency volume pulsers**
- **High accuracy**
- **Easy to use**
- **DSfG compatible**
- **PTB approval for custody transfer**

The new EK-87 has been designed for gas metering systems which require the highest metering accuracy and functionality while at the same time being easy to operate. Such systems can be found in gas substations belonging to gas transport companies as well as in metering plants for end-users.

The EK-87 is a DSfG-compatible volume corrector for use with natural gases and which includes a built-in data storage device for the long-term registration of actual volumes, standard volumes and mean values of pressure and temperature.

It has a modular design and is available in two different housings:

- EK-87/S in a 19" slide-in cassette for installation in a cabinet
- EK-87/A has a housing for wall mounting

# Product features

## Hardware

- control panel with display, keyboard, calibration switch and serial interface
- mains sockets for 230 VAC and 24 VDC supply voltage
- two pulse inputs for high and low-frequency signals, intrinsically safe
- one input for a pressure sensor, 2-wire system, intrinsically safe
- one resistance input for Pt-100 temperature sensor, 4-wire system, intrinsically safe
- one relay output
- four transistor outputs, of which two can be officially sealed if required

## Software functions

- calculation of compressibility factor according to SGERG-88 or AGA-NX-19... or as a constant
- calculation of flow rate with limit monitoring and storage of minimum and maximum values
- electronic logbook for over 200 entries
- freeze function for two sets of measurement data including the possibility of showing the differences between the two

- remote control of the gas analysis data for the calculation of the compressibility via the DSfG interface, logbook for the changes concerning the gas analysis data
- 4-channel data storage function (DS-100)

## Sensors

- Rosemount 2088 A or 3051 CA pressure sensor (up to 120 bar)
- Pt-100 temperature sensor, 4-wire system in various versions with lengths of up to 250 mm

## Additional equipment (optional)

- AA2 analog output card, 2 channels, 0/4 ... 20 mA
- S1M modem connection (second serial interface, for use as an alternative to the interface on the front panel)
  - for EK-87/S plug-in connection at the back
  - for EK-87/A socket in the connection box
- DSfG interface
- DCF-77 radio-controlled clock (only for use as an alternative to the DSfG interface card)

# Operation

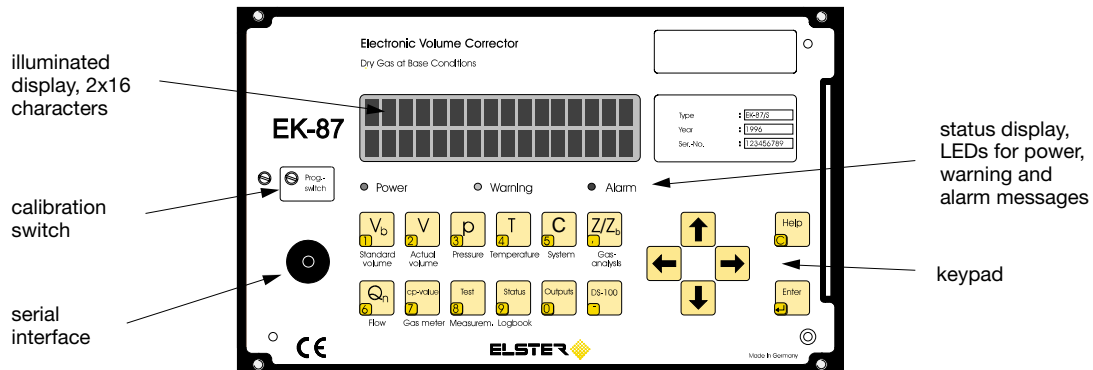
All of the measurement values and data, with the exception of the individual interval values in the data storage function, can be called up via the control panel. The most important values and functions are accessible directly via the keys whereas all other values are ordered in a list and can be selected by using the cursor keys. The information is then displayed with a clear indication of the value and the unit of measurement. By using the Help function, additional clarifying information can be displayed in text form.

In the case of a fault in the device or in the metering system, the EK-87 offers various

troubleshooting possibilities. As well as the status register, which keeps a record of all error messages until they have been rectified, a separate list of rectified errors and an operating logbook are also available. The list of rectified errors contains all error messages including date and time in the order in which they have been rectified. The logbook has a chronological list of alarms, warnings and instructions.

In order to monitor the accuracy during operation, an extensive freeze function is available. By keying-in the time or a test volume, the actual values can easily be determined.

## System integration



### Inputs

The EK-87 can be connected to any gas meter which is fitted with one or two pulsers. It processes both low and high-frequency pulse signals from potential-free pulsers or NAMUR pulsers. All pressure and temperature sensors can be used either in an intrinsically safe version or in a flameproof enclosure. To conform with the requirements concerning explosion protection, both must be of the same type (EEx-i or EEx-d).

### Outputs

The digital and analog outputs can be assigned as required. For the pulse output, it is possible to choose between actual and standard volume. If a digital output is used as a switch output, it is possible to choose between alarm, warning or monitoring a specific message, e.g. "calibration switch open". The limit control function for the interval and daily counters in the DS-100 function can also be used as a specific message. Programming a time synchronizing output is a further possibility. Two of the transistor outputs can be officially sealed. They can be accessed via a separate socket. The values for standard flow, actual flow, pressure, temperature, can be assigned to the analog outputs if the appropriate card is installed.

### Digital interface for gas metering devices (DSfG)

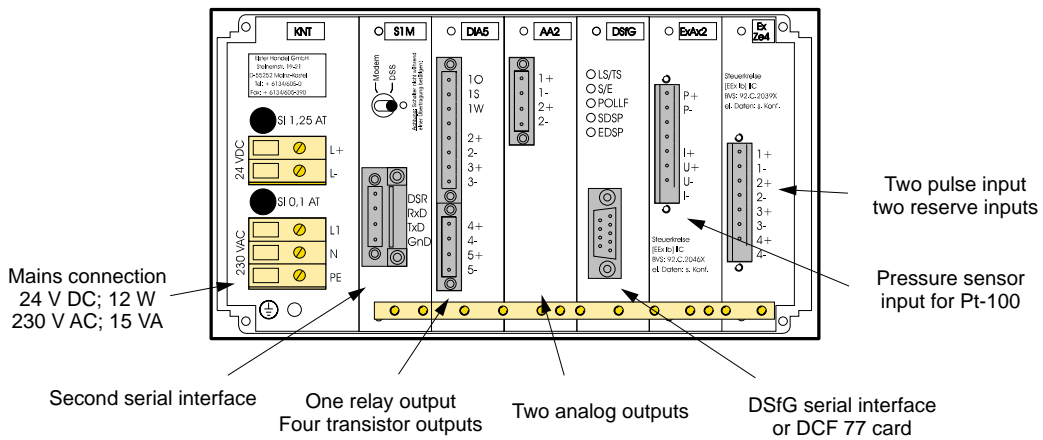
The DSfG interface enables the connection of the EK-87 to the DSfG-Bus. This interface is based on the DVGW worksheet G485 and is used to call up meter readings and metering data for further processing in DSfG-compatible devices. The data concerning the characteristics of the gas, which is used for the calculation of the compressibility factor, can also be changed via the DSfG interface. Every change is registered in a special logbook so that a record of the changes can be seen at a later date.

### RS 232/ V.24 serial interface

As a standard feature, the EK-87 is equipped with a serial interface, which is located on the front panel. Using this interface, the integrated data storage function can be operated and the data for the volume corrector can be programmed or called up. If a fixed connection to a data transfer device is required, an alternative connection, the S1M modem interface, can be made available at the back of the device (EK-87/S) or at the bottom of the connection box (EK-87/A).

### DCF-77 radio-controlled clock

If no DSfG interface card is installed, an interface card connected to an external DCF-77 receiver can be installed in the device for the purposes of synchronizing the time.



### Data storage device

A standard feature of the EK-87 is the data storage device (DS-100), which stores standard and actual volumes as well as the mean values for pressure and temperature for a given period of time. It has sufficient capacity to record data for up to 6 months when using a time interval of 60 minutes. In addition, the meter readings used for billing

purposes at the beginning of the month are also stored.

The stored data can be read out by means of a mobile readout device, a portable PC or remote data transfer and then further processed in the Elster LIS-100 data collection system.

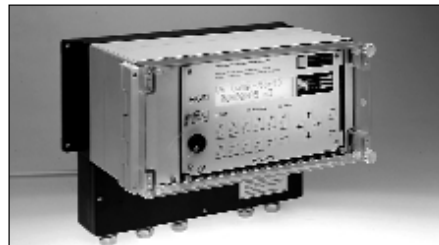
## Ordering

In order to process your order as quickly as possible, the following information is required:

- version of the device: EK-87/S or EK-87/A
- pressure sensor: version and pressure range
- temperature sensor: version EBL ... (length)
- additional equipment: analog output card, DSfG interface, DCF receiver, additional serial interface
- accessories



EK-87/S



EK-87/A

## Accessories

- 19" mounting frame (for up to 2 EK-87/S models)
- front cover plate for the frame
- temperature sensor thermowell in various versions
- three-way test valve
- base plate for pressure sensor
- connection cables
- uninterrupted power supply systems

## Technical data

Version	EK-87/A	EK-87/S
<b>Housing</b>	wall housing with separate protected connection box	19" slide-in cassette (42 TE, 3 HE)
<b>Dimensions (mm)</b>	W 310 x H 223 x D 280	W 213 x H 128.5 x D 228,5
<b>Weight</b>	approx. 2.5 kg	approx. 2.5 kg
<b>protections class</b>	IP 54	IP 20
<b>Ambient temperature</b>	-10 °C to +50 °C	0 °C to +40 °C
<b>Power supply</b>	230 V <sub>AC</sub> , 15 VA or 24 V <sub>DC</sub> , 12 W, backup battery for storing data in the event of a power failure	

### Pulse inputs

Version according to NAMUR, monitors cable faults, voltage level and card failure

Number: 2

Max. frequency: 3000 Hz

no-load voltage: 8 V ± 5 %

short-circuit current: 8 mA ± 5 %

switch threshold "on": 2.1 mA ± 5 %

switch threshold "off": 1.2 mA ± 5 %

### Analog input for pressure sensor

4 - 20 mA, two-wire system

no-load voltage: 17,5 V ± 10 %

short-circuit current: max. 24 mA

resistance load: 270 Ω

### Pt-100 input

four-wire system

no-load voltage: max. 8 V (I+, I-)

short-circuit current: 0.4 mA ± 1 %

### Digital/pulse outputs

1 relay two-way contact

voltage U<sub>max</sub>: 250 V

current I<sub>max</sub>: 2 A

contact rating P<sub>max</sub>: 60 W, 125 VA

remaining current: max. 0,02 mA

maximum frequency: 1 Hz

4 transistor outputs

voltage U<sub>max</sub>: 28.8 V

current I<sub>max</sub>: 50 mA

voltage drop: < 1.8 V at 50 mA

remaining current: < 0.5 mA at 28.8V

maximum frequency: 10 Hz

galvanic separation: from the system and from each other

### Analog outputs

2 outputs: 0/4 – 20 mA

maximum load: 600 Ω

Error: < 0.25 % of measured value

galvanic separation: from the system and from each other with common ground

### Data interface

RS 232C / V.24

input voltage: < 30 V

input level „1“: ≥ 3 V

input level „0“: ≤ 0 V

baud rate: 4800 baud

### Explosion protection for meter and measurement inputs

	Pulses	Pressure	Temperature
<b>Mark</b>	[EEx ib] IIC		
<b>Approval</b>	BVS 92.C.2039X	BVS 92.C.2046X	
<b>Limits</b>	U <sub>0</sub> < 11.6 V	< 20 V	< 9.6 V
	I <sub>n</sub> < 11.8 mA	< 75 mA	< 3 mA
	L < 10 mH	< 0.5 mH	< 10 mH
	C < 300 nF	< 200 nF	< 400 nF

# Pressure sensors

Version	Rosemount 2088 A	Rosemount 3051 CA
<b>Type</b>	absolute-pressure sensor, 2-wire system	
<b>Pressure range</b> - for custody transfer - no official measurements	up to 50 bar absolute up to 120 bar absolute	up to 120 bar absolute up to 120 bar absolute
<b>Standard measuring ranges</b> (bar absolute)	0.6..1.9 0.9..4.5 2.0..10 3.0..15 4.0..20 10.0..50	0.9..4.5 2.0..10 3.0..15 4.0..20 6.0..30 10.0..50 14.0..70 20.0..100
<b>Measuring ratio</b>	$p_{max} : p_{min} \leq 5 : 1$ und $\geq 2,4 : 1$ for custody transfer	
<b>Further measuring ranges</b>	as required within measuring ratio	
<b>Measuring error (at 20 °C)</b>	< ± 0.3 % of measured value	< ± 0.2 % of measured value
<b>Measuring error (at -10°C.. 40°C)</b>	< ± 0.5 % of measured value	< ± 0.3 % of measured value
<b>Explosion protection stamp</b>	intrinsically safe EEx-ia IIC T4/T5, alternatively flameproof enclosure EEx-d IIC T5/T6	
<b>Weight</b>	approx. 0,9 kg	approx. 2,5 kg
<b>Process connection</b>	tapping screw for 6 mm pipe (Ermeto)	
<b>Electric connection</b>	screw clip, lead ½" NPT	
<b>Connection cable</b> (2 wires and screen)	total diameter 8 - 10 mm, 2 x 1,5 mm <sup>2</sup> or 2 x 2 x 0,75 mm <sup>2</sup> for intrinsically safe circuit light blue sheath	
<b>Ambient temperature range</b>	-40°C to +85°C; for custody transfer: -10°C to +40°C	



Rosemount 2088 A



Rosemount 3051 CA

Further approved pressure sensors for custody transfer:  
Rosemount AP/GP 1151, Druck PTX-610

# Temperature Sensors

Version EBL...	50AF/EX-I	160AF/EX-I	250AF/EX-I	140AD/EX-I	160AF/EX-D	250AF/EX-D	160AD/EX-D
<b>Type</b>	Pt-100 1/3 DIN class B						
<b>Gas temperature range</b>	-10 °C .. +60 °C (for custody transfer)						
<b>Measuring error</b>	< ± 0.1 % of measured value						
<b>Length (installation)</b>	88 mm	160 mm	250 mm	140 mm	160 mm	250 mm	160 mm
<b>Diameter of sensor</b>	4 mm	6 mm	6 mm	8 mm	6 mm	6 mm	11 mm
<b>Process connection</b>	8 mm plug-in syst.	G1/2"	G1/2"	G3/4"	G1/2"	G1/2"	G3/4"
<b>For Elster thermowell</b>	EBL 45, 50, 58,67	EBL 160	EBL 250	in Medium at 16 bar	EBL 160	EBL 250	in Medium at 100 bar
<b>Explosion protect. stamp</b>	intrinsically safe EEx-ia IIC T4/T5/T6				flameproof enclosure EEx-d IIC T6		
<b>Electrical connection</b>	screw clips						
<b>Lead</b>	PG 9				according to EN 50018		
<b>Connecting cable</b> (4 wires and screen)	total diameter 6,5 - 9 mm e. g. 2 x 2 x 0,75 mm <sup>2</sup> , color light blue				total diameter 8 - 10 mm e. g. 4 x 1,5 mm <sup>2</sup>		



EBL 50AF/EX-I

EBL 160AF/EX-I  
EBL 250AF/EX-I  
EBL 140AD/EX-I



EBL 160AF/EX-D  
EBL 250AF/EX-D  
EBL 160AD/EX-D



