

# Diaphragm gas meters with Absolute ENCODER

Absolute ENCODER index AE5 for diaphragm gas meters BK-G..A

## Diaphragm gas meters BK-G1.6 to BK-G100

### Applications

The electronically readable mechanical roller index for Honeywell residential, commercial and industrial diaphragm gas meters (BK-G..A, G1.6 to G100).

Media: natural gas, town gas, propane, butane\*, air, inert gases\*\*

Industries: gas industry

Tasks: recording the volume at measurement conditions, data transfer

### Brief information

BK series diaphragm gas meters record the gas consumption and meet high demands with respect to their measurement accuracy and safety.

The diaphragm gas meter measuring unit operates on the pneumatic control principle. The results include low bearing loads and quiet operation. The sturdy plastic diaphragm has the time-tested stadium shape.

The housings are made of corrosion-resistant sheet steel and are available in a co-axial or a two-pipe design.

The technology is based on opto-electronic scanning which identifies the position of the individual rollers on the mechanical index in a contact-free process.

A communication module is used for data transmission to a downstream receiving unit.

The power supply of the Absolute ENCODER is provided by the receiving unit or the connected communication module. A battery is therefore not required for operation of the Absolute ENCODER.

### Operation

Measuring chambers separated by plastic diaphragms are periodically filled with gas and then emptied. A crank drive mechanism transfers the diaphragm movements to the crank shaft. The crank shaft drives the slides which control the gas flow. The rotary movements of the mechanism are transferred to the index via a magnetic coupling.

In the BK-G...AT version, a bimetallic element on the crank shaft compensates for the influence of the gas temperature.

The digit rollers of the mechanical index are individually scanned by opto-electronic means.

The light barriers consist of phototransistors, LEDs and optical waveguides which are all scanned and evaluated one after the other using time-series analysis. A microprocessor encodes the position of each individual digit roller and transmits the data to the connected communication module using a defined protocol.

\* Gases in acc. with EN 437

\*\* Gases in acc. with DVGW Code of Practice G260



## Main features

- MID conformity
- DVGW approved under EN 1359
- PTB approval
- Powder-coated in RAL 7035 light grey
- Fire-resistant (HTR) up to 0.1 bar
- Recording and forwarding absolute meter readings.
- Cable-based or wireless data communication available as options.
- Opto-electronic scanning of the digit rollers.
- The metrology-relevant part operates independently of electrical power.
- Simple plug-in installation of communication modules with immediate availability.

### Options

- Communication modules for the Absolute ENCODER can be retrofitted in the field.

## Transmission protocols

The Absolute ENCODER, in combination with suitable communication modules, provides various interfaces which differ in terms of the hardware and the transmission protocols.

Protocol interpretation is available on request.

### Standard M-Bus

Cable-based interface in conjunction with ACM M-BUS WIRE.

The M-Bus standard protocol in accordance with DIN EN 13757-2:2004 (link layer) and DIN EN 13757-3:2004 for meters and remote meter reading is implemented.

### M-Bus to OMS (Open Metering System), Volume 2

Cable-based interface in conjunction with ACM M-BUS WIRE.

The M-Bus data transmission protocol to OMS Vol. 2 is implemented. Communication is not encrypted.

### SCR

Cable-based interface in conjunction with ACM SCR WIRE. This interface is designed to connect the gas meters with electronic volume conversion devices and data loggers.

Data transmission is not encrypted.

### Multi-protocol

The multi-protocol combines the OMS M-Bus and SCR protocols.

The required protocol is activated by the selected communication module.

### Wireless M-Bus

Wireless data transmission in conjunction with ACM M-BUS RADIO. The M-Bus data transmission protocol Wireless M-Bus to OMS Generation 4 with Security Profile B (Mode 7) is implemented.

When using this wireless communication module, data is transferred in encrypted form.

## Sealing

Like a mechanical index, the Absolute ENCODER is secured with a metrological seal.

It secures access to the metrology-relevant part of the gas meter and the parameterization of the ENCODER.

An installer seal is included in the communication module package to protect the communication modules and is affixed once the communication module has been connected to the ENCODER index.

Thanks to this separate seal, which does not affect the metrology-relevant part of the gas meter, the connection cable of the cable-based communication module can be installed on site and simply replaced at any time.

## Tamper protection

The digit rollers are individually scanned by opto-electronic means. The Absolute ENCODER is thereby not prone to faults caused by static magnetic fields.

The mechanical recording system in the metrology-relevant part of the gas meter is resistant to electromagnetic interference.

Tampering via the viewing window in the index can be verified by checking for pressure marks.

Three small bars behind the index disc leave clearly visible marks on the index plate when pressure is applied to the index.

## Technical data

The Absolute ENCODER is suitable for diaphragm gas meters BK-G1.6 to BK-G100.

All the digit rollers are scanned by opto-electronic means.

Ambient temperature: -25 to +55°C.

Maximum operating pressure: 0.5 bar.

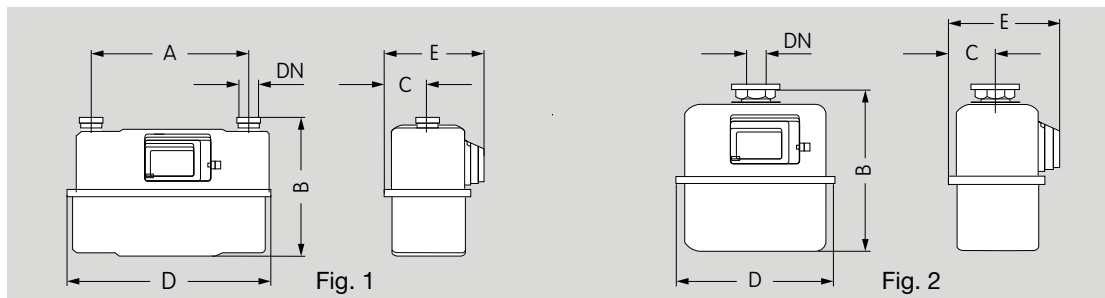
Enclosure: IP 54.

The Absolute ENCODER with diaphragm gas meters BK-G1.6 to BK-G100 is MID approved.

## Meter sizes and diaphragm meter flow rate

BK-	Cyclic volume [dm <sup>3</sup> ]	Q <sub>min</sub> [m <sup>3</sup> /h]	0.1 Q <sub>t</sub> [m <sup>3</sup> /h]	Q <sub>max</sub> [m <sup>3</sup> /h]
G1.6	1.2	0.016	0.25	2.5
G2.5	1.2	0.025	0.4	4
G4	1.2	0.04	0.6	6
G4	2	0.04	0.6	6
G6	2	0.06	1.0	10
G10	6	0.10	1.6	16
G16	6	0.16	2.5	25
G25	12	0.25	4.0	40
G40	18	0.4	6.5	65
G65	24	0.65	10	100
G100	48	1.0	16	160

## Dimensions of diaphragm gas meters

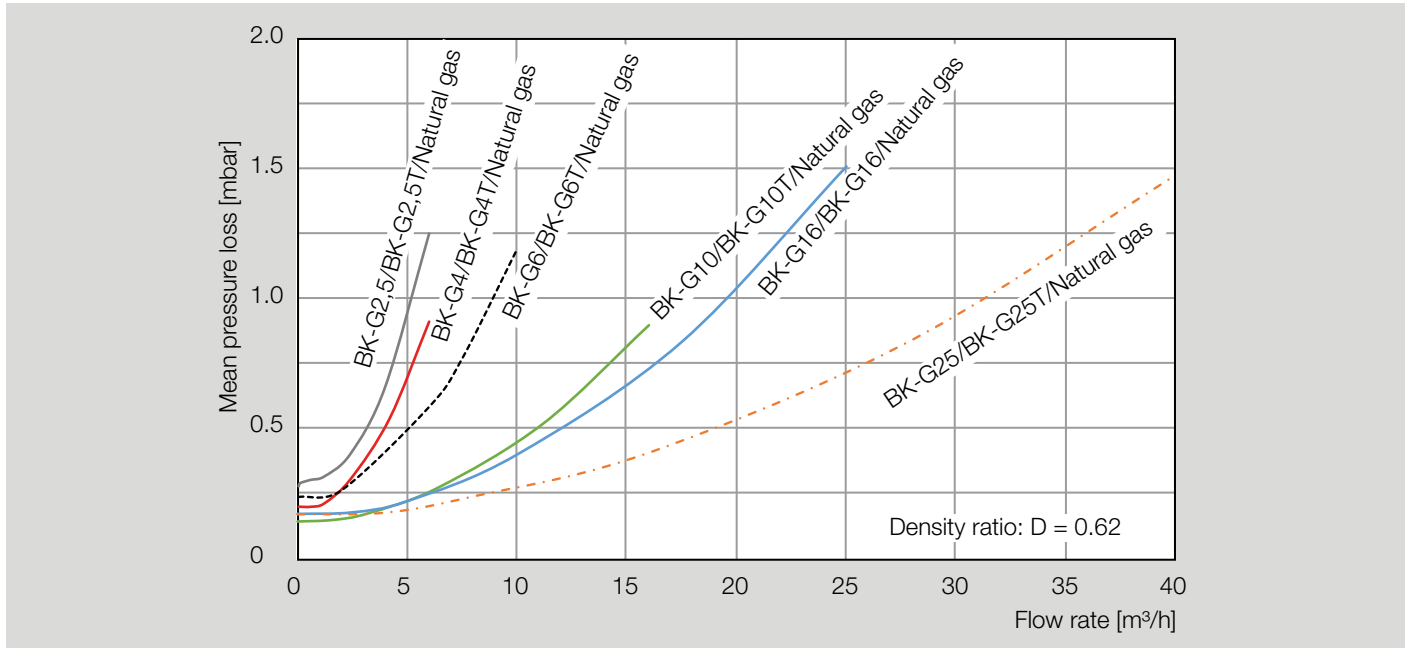


Name	Fig.	Nominal size DN*	Thread	Dimensions					Weight kg
				A	B	C	D	E**	
		mm		mm	mm	mm	mm	mm	
BK-G1.6...BK-G4 V1.2	1	25	1 ¼"	110	214	67	194	169	1.9
	2	25 E	2"	/	215	67	194	169	1.9
BK-G4 V2	1	25	1 ¼"	250	241	71	327	175	3.5
	2	25	2"	/	251	71	226	175	3
BK-G6 V2	1	/	1"[BS 746]	152.4	262	71	226	175	3
	1	25	1 ¼"	250	241	71	327	175	3.5
	2	25 E	2"	/	251	71	226	175	3
BK-G10	1	40	2"	280	330	108	405	246	5.7
	1	/	1 ¼"[BS 746]	152.4	337	100	264	230	5
	2	40 E	2 ¾"	/	323	85	334	230	5.1
BK-G16	1	40	2"	280	330	108	405	246	5.7
	1	/	2"[BS 746]	250	351	108	405	246	6.5
	2	40 E	2 ¾"	/	323	85	334	230	5.1
BK-G25	1	50	2 ½"	335	398	138	465	301	10
	2	50	4xM10	/	385	138	465	301	10.6

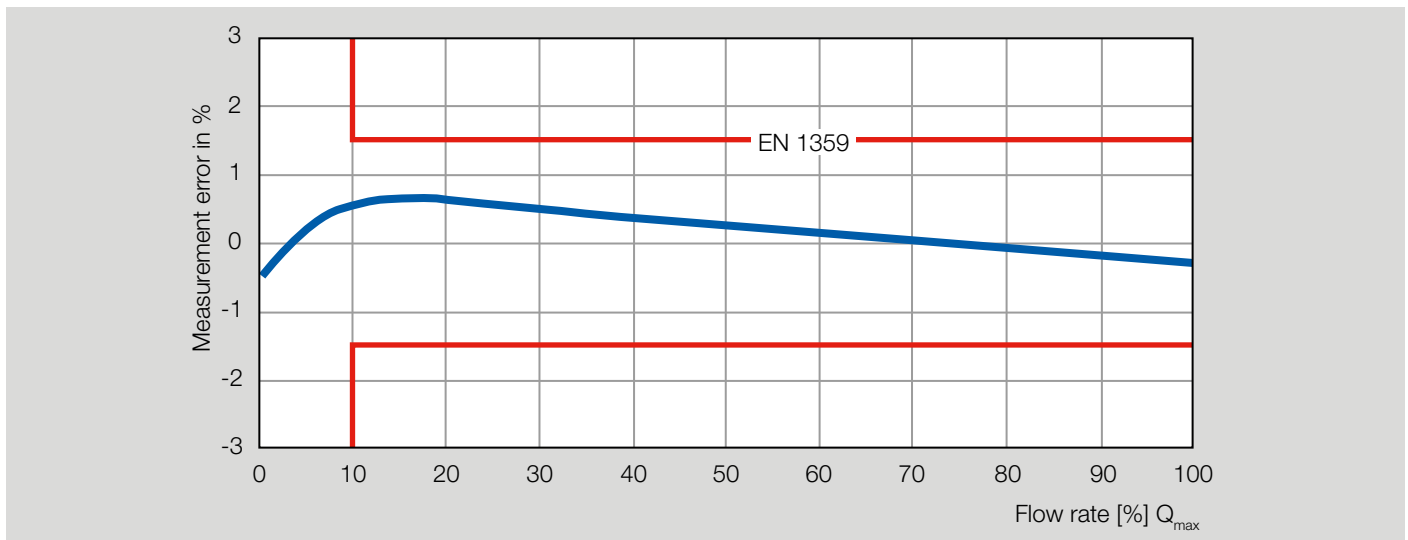
\* ISO 228-1

\*\* The dimension E figure includes an installed ACM.  
Additional connection dimensions available on request.

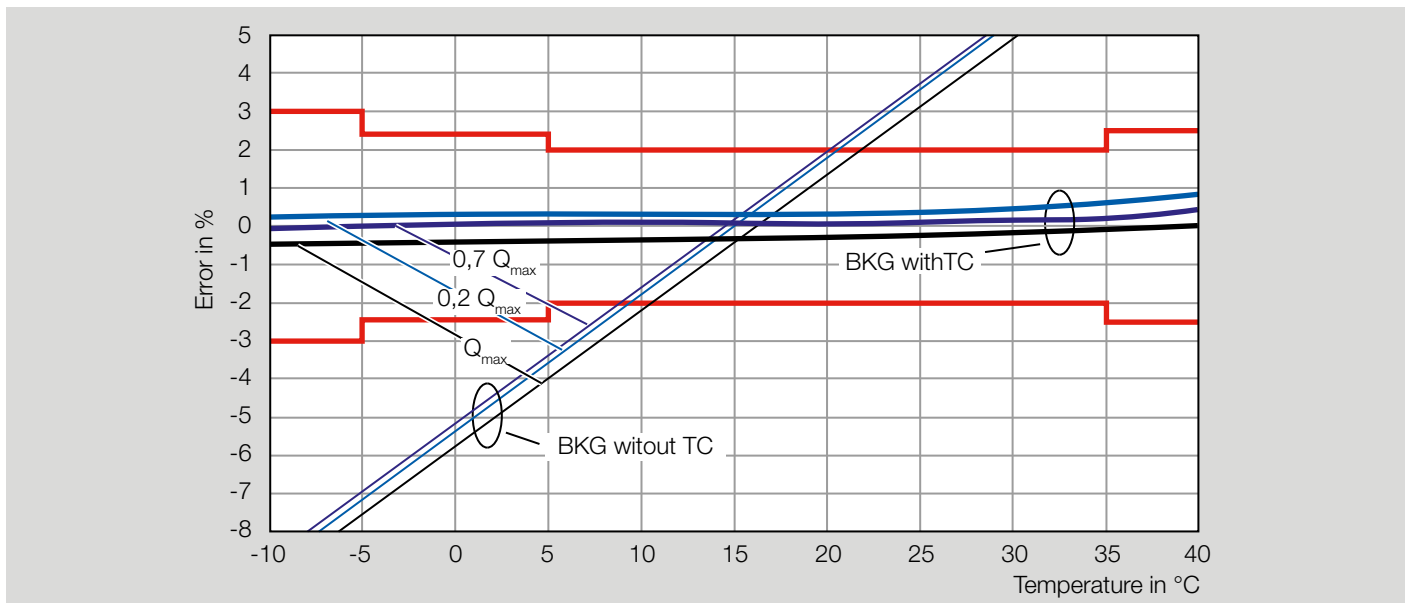
## Pressure loss diagram for diaphragm gas meters



## Error curve for diaphragm gas meters



## Temperature properties of diaphragm gas meters



## System description

### Absolute ENCODER communication modules (ACMs) for smart metering

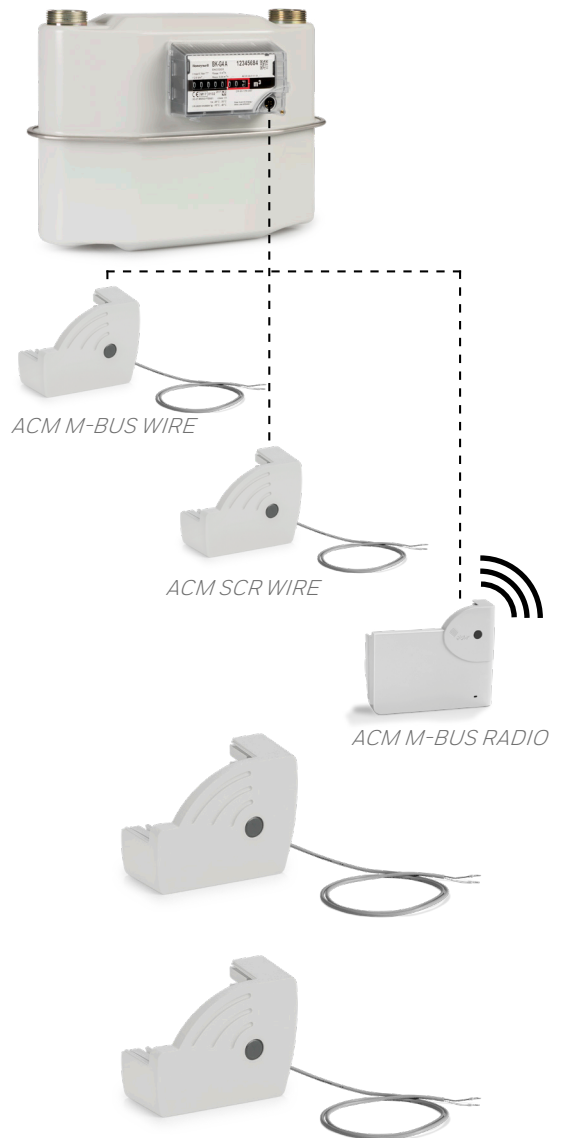
The absolute meter reading is provided by the Absolute ENCODER AE5 index. The communication modules ACM M-BUS WIRE and ACM SCR WIRE transfer the data by cable to a downstream receiving unit, while the ACM 5.X M-BUS RADIO enables the data to be transferred by Wireless M-Bus.

The communication module is designed as a plug & play solution and is simply plugged into and sealed to the ENCODER index.

The connected receiving unit is synchronized automatically.

The modular connection between the communication module and ENCODER index enables communication modules to be replaced at any time without additional programming being required.

The metrology-relevant part of the gas meter thus remains unaffected.



### ACM M-BUS WIRE

The cable-based communication module ACM M-BUS WIRE is connected to an M-Bus master which communicates using the standard M-Bus or M-Bus/OMS (Open Metering System).

### ACM SCR WIRE

The cable-based ACM connects the Absolute ENCODER AE5 and the receiving unit with an SCR interface. Elster can supply compatible data loggers and volume conversion devices.

### Technical data

Enclosure: IP 54.

Ambient temperature: -25 to +55°C.

Connection cable design: 2 m flexible, two-core LiYY cable, fireproof pursuant to IEC 60332-1, cross-section = 0.25 mm<sup>2</sup>.

The free cable end has 2 wire end ferrules.

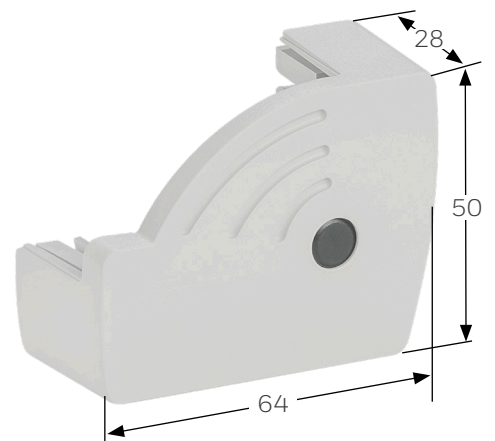
The ACM M-BUS WIRE supports data transmission protocols based on the standard M-Bus and M-Bus to OMS (Open Metering System).

The ACM SCR WIRE supports the SCR data transmission protocol (OBIS code numbers pursuant to OMS).

Power supply via M-Bus: 3 mA (2 M-Bus loads).

Power supply via SCR: 3 mA.

Dimensions: in mm



## ACM 5.X M-BUS RADIO

The communication module transfers the meter reading on a unidirectional basis to a suitable receiving unit – in Germany, the smart meter gateway. The transmission complies with BSI TR-03109.

The ACM is delivered fully programmed.

### Technical data

Frequency range: 868 MHz

Protocol:

Wireless M-Bus to OMS Generation 4 with Security Profile B (Mode 7).

Transmission capacity: around 7 mW (14 dBm output power)

Transfer: unidirectional.

Transmitter range: up to 400 m depending on the environment.

Transmission interval: every 5 minutes.

Meter reading update: every 20 minutes.

Power supply: 1 3.6 V lithium battery (not replaceable).

Battery life: 20 years (calculated).

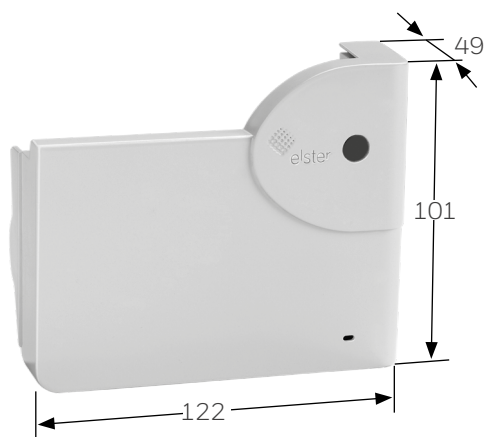
Operating temperature: -25°C to +55°C.

Storage temperature: -30°C to +60°C.

Relative humidity: 0 to 85%.

Enclosure: IP 54.

Dimensions: in mm



For more information, please contact: [www.elster-instromet.com](http://www.elster-instromet.com)

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