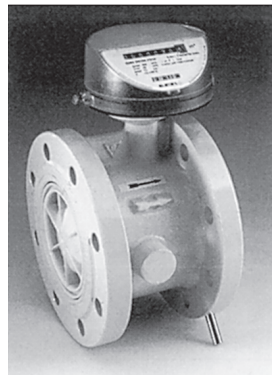
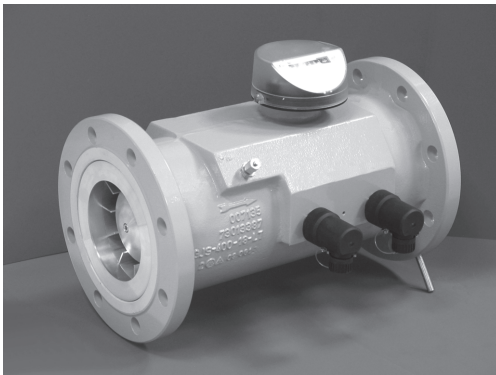


Instruction Manual Turbine Gas Meters and Quantometers

Type TRZ2 · Q



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1. Intended Use and Field of Application

This product is intended

for **calibratable** volumetric metering using **turbine gas meters** and for **non-calibratable** volumetric metering using **quantometers** of

- flammable gases: natural gas/town gas/propane/butane/hydrogen,
- non-flammable gases: air/nitrogen/inert gases
- and is suitable for use in potentially explosive atmospheres of Category 2 (Zone 1) of Class **EX II 2 G c IIC T4**

Other fields of application/media on request.

The permitted gas and ambient temperature is $t_m = -25^{\circ}\text{C}$ to $+55^{\circ}\text{C}$, unless otherwise specified on the main plate (index plate).

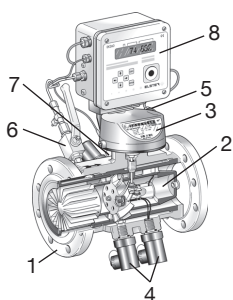
The storage temperature is -25°C to $+55^{\circ}\text{C}$.

The meters are suitable for mechanical ambient conditions of Class M1 of the Directive. For meters with an encoder index, Class E2 for electromagnetic ambient conditions also applies.

This product is not intended

- for metering of aggressive gases, e.g. biologically produced methane or sewage gases, oxygen, acetylene

Turbine gas meter with volume corrector (optional)



- 1 Meter housing
- 2 Measuring cartridge
- 3 Index
- 4 HF pulse generators
- 5 LF pulse generator
- 6 Pressure test point with two-way cock
- 7 Temperature test point
- 8 Electronic volume corrector (optional)

Please contact your Elster-Instromet Customer Service for assistance in commissioning, maintenance and installation of encoders, pulse generators and volume correctors for instance.

2. Technical Data

Turbine gas meters and quantometers in accordance with DIN EN 12261

Type	TRZ2	Q
Dimensions	G65 – G1000	Q65 – Q1000
Nominal size	DN 50 – DN 150	
Pressure rating	PN 10 – 100 / Class 150 – 600	
Housing material	Spheroidal graphite cast iron, steel	
Temperature ranges		
– gas	-20°C to +60°C	-20°C to +60°C
– ambient/storage	-20°C to +70°C	-20°C to +70°C
– gas/ambient/storage (MID)	-25°C to +55°C	

The nominal operating conditions can be found on the labels on the index head.

Pulse generators

LF pulse generator IN-Sxx/IN-Wxx	HF pulse generator (in accordance with DIN EN 50227)
$U_{\max} = 24 \text{ V}$	$U_{\text{rated}} = 8 \text{ V DC}$
$I_{\max} = 50 \text{ mA}$	$I \geq 2.1 \text{ mA}$ (exposed) $I \leq 1.2 \text{ mA}$ (covered)
$P_{\max} = 0.25 \text{ VA}$	$U < 5.9 \text{ V}$ (exposed) $U > 6.8 \text{ V}$ (covered)
$R_i = 100 \Omega$ (series resistor)	$R_i = 1 \text{ k}\Omega$
Temperature range -40°C to +70°C	-25 to +60°C

Absolute ENCODER S1

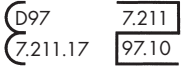

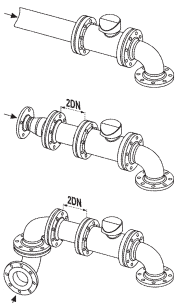
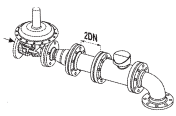
	Absolute ENCODER S1 – index
Number of digit rollers	8
Temperature range	-20°C to +60°C
Protection class	IP 67
Interfaces (ATEX approval)	NAMUR (II 2 G EEx ia IIC T4) or
	SCR/SCR+ (II 2 G EEx ib IIB T4) or
	M-Bus
LF pulse generator	Optional or retrofittable, all IN-Sxx variants, IN-W11 $U_{\max} = 24 \text{ V}$, $I_{\max} = 50 \text{ mA}$, $P_{\max} = 0.25 \text{ VA}$, $R_i = 100 \Omega$ (series resistor)

3. Operating Location

The **minimum length of the inlet section for TRZ2 must be at least twice the nominal diameter** for reasons relating to measurement accuracy.

The inlet section must be designed as a straight pipe section with the same nominal diameter as the meter.

The length of the outlet section is at least 1 x DN of the same nominal diameter.

Flow disturbances resulting from:	Typical inlet sections Pipe sections installed at a distance of 2D upstream of the meter inlet	TRZ2 PTB approval symbol  DE-09-MI002-PTB001  0102	Q
Minor disturbances – single manifolds – twin manifolds – diffuser and – contractors		$L \geq 2D$ No flow conditioner	$L \geq 5D$
Major disturbances – pressure regulators for gas – other restrictor devices		$L \geq 2D$ No flow conditioner	$L \geq 5D$ Flow conditioner recommended

If you...

- wish to mix in **odorization agents** or
- use **solenoid valves**,

please always fit them only **downstream of the meter**. Otherwise, the unit may be damaged.

The **flow** through the meter must be **free of vibrations/pulsations** in order to avoid measuring errors.

Compliance with the specified **operating and ambient conditions** as indicated on the type label is absolutely essential for **safe operation** of the meter and additional equipment.

The gas may not contain **suspended particles > 50 µm**. In addition, the **gas must be dry**. Otherwise, the meter may be damaged.

In the case of new installations, we recommend temporarily **installing** a cone strainer (mesh size 250 µm) to protect the meter. The strainer **should be removed after approximately 4 weeks**.

4. Staff

These **Instructions are aimed at staff** who have adequate specialist and technical knowledge (in Germany, for instance, in accordance with DVGW Codes of Practice 492 and 495 or comparable technical regulations) on the basis of their training and experience in the sector of energy and gas distribution.

Attention: Incorrect use can be fatal!

5. Legal Declarations

- Declaration of Conformity – see Annex.
- Period of validity of calibration – this is based on the regulations of the country concerned, where the turbine gas meter will be used.

6. Installation / Connection

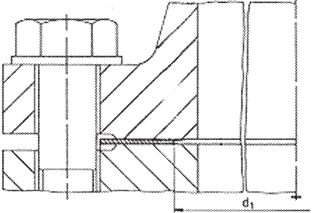
Warning! Never clean the plastic cover of the index **with a dry cloth** owing to the **risk of explosion resulting from electrostatic discharge!** Please only ever use an adequately moistened cloth!

Before installation please ensure:

- that the **protective caps and/or plastic sheeting is or are removed**,
- that the meter and accessories have been **inspected for transport damage** and
- that the accessories have been checked for completeness (e.g. plug connectors, oil for initial filling).

You will require the following items for installation:

- suitable **seals/gaskets** for the relevant gases, e.g. in accordance with the following table:

	DN	d1 (mm)	The following seals and gaskets, amongst others, are suitable: – flat seals, – spiral-wound gaskets and – grooved seals and gaskets
	50	62	
	80	100	
	100	125	
	150	178	

- **connection elements** suitable for operation in accordance with the tables below:

Hexagon screws and nuts for flanges in accordance with DIN EN 1092-1

Material/strength class		Operating limits	Standards
Screw	Nut		
5.6	5	up to 40 bar down to -10°C	DIN ISO 4014 DIN ISO 4032
8.8	8		
CK 35	CK 35	up to 100 bar down to -10°C	DIN 2510
25 Cr Mo4	25 Cr Mo4	up to 100 bar down to -25°C	EN 10269

Stud bolts with continuous thread for flanges in accordance with ASME B 16.5

Material/strength class		Operating limits	Standards
Bolt	Nut		
A 193 B6	A 194 Gr. 6	up to 100 bar down to 0°C	ASME B 1.1
A 193 B7	A 194 Gr. 2H	up to 100 bar down to -50°C	

Other equivalent materials may also be used.

Then install the **meter**

- gas-tight,
- with the supplied accessories,
- only in **flow direction** (as marked by an arrow on the meter housing),
- only **unstressed** and
- preferably in **horizontal position** with the index at the top.

The **permitted installation/operating positions** of the meter are **specified** on the **main label** in accordance with the designations “H”, “V” or “H/V” (H = horizontal, V = vertical) represented in accordance with DIN EN 12261. If you have specified the installation or operating position when ordering, all attachments will have been fitted in accordance with the installation position ex-works.

If you wish to **install the unit vertically at a later point** and if an oil pump is present, the oil pump must also be fitted vertically. If this is not the case, you must turn the oil pump and its oil connection line and any other attachments, e.g. volume corrector, through 90° before installing the meter.

We recommend that you contact our Customer Service for such conversion work.

- weatherproof.
- When fitting the seals and gaskets, ensure that they are **aligned concentrically** and do not project into the flow channel.

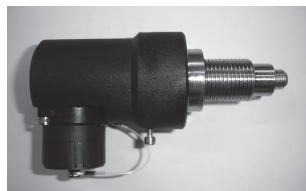
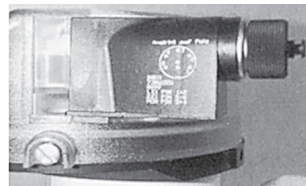
7. Pulse Generators

Type IN-Sxx or IN-W **LF pulse generators** may be plugged onto the side of the index cover for **volume pulse output** to external devices (e.g. a volume corrector).

Fit the pulse generator (if required) as follows:

- Slide both **guides** of the IN-S pulse generator into the guide slot on the index cover until the guides can be heard to engage (clicking sound).
- Assign the **terminals** on the plug in accordance with the pin assignment on the meter/pulse generator.
- Use a **screened cable** to the external device.

You can use **HF pulse generators** (Types A1R and A1S) for higher frequencies (if available). HF pulse generators are screwed into the meter housing pressure-tight. However, the connection plug can be turned.



- Assign the **terminals** on the plug in accordance with the pin assignment on the unit.
- Use a **screened cable** to the external device.

Pulse generators for subsequent installation are also available.

HF pulse generators (Type A1S) can, however, be fitted **only by the Customer Service**. By contrast, you can connect the plug yourself, as described above.

Warning! All pulse generators are intrinsically safe and may be connected only to **intrinsically safe circuits** if used in **potentially explosive atmospheres**. The safety barriers must comply with the requirements of ignition protection **EEx ib IIC** (see also Marking in Annex A).

8. Pressure Test Point

A straight male coupling in accordance with DIN 2353 is pre-fitted on the meter housing for measuring the reference pressure.

The **pressure test point** is marked P_m/P_r and is designed for connection of $d = 6$ mm steel tube in accordance with DIN EN 10305-1 (e.g. steel grade E 235).

Important: Do not connect the straight male coupling to **pipes** made of **stainless steel** or pipes made of **nonferrous materials**.

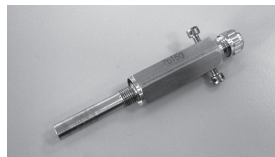
Note: We recommend that you use original Parker-Ermeto pipe unions.

Functional safety and reliability are ensured only if the material combination of the union component and the pipe are intermatched.

We recommend that you contact our **Customer Service** for conversion work and when installing additional devices.

9. Temperature Test Points

You can use a maximum of two **temperature sensors** for **measuring the gas temperature** in the meter housing for the meter sizes listed in the table below (quantometers cannot be fitted with thermowells in the meter housing; on TRZ2 thermowells are optional up to nominal diameter DN 150):



Max. sensor dia.	TRZ2 DN	Housing material	PN 10/16 EBL	PN 25/40	Class 150	Class 300	Class 600
6 mm	50	GGG	—	—	—	—	—
		ST	—	—	—	—	—
	80	GGG	45 (2x)	—	45 (2x)	—	—
		ST	45 (2x)	45 (1x)	45 (2x)	45 (1x)	45 (1x)
	80/100	GGG	58 (2x)	—	58 (2x)	—	—
		ST	58 (2x)	58 (1x)	58 (2x)	58 (1x)	58 (1x)
	100	GGG	50 (2x)	—	50 (2x)	—	—
		ST	50 (2x)	50 (1x)	50 (2x)	50 (1x)	50 (1x)
	100/150	GGG	67 (2x)	—	67 (2x)	—	67 (2x)
		ST	67 (2x)	67 (2x)	67 (2x)	67 (2x)	67 (2x)
	150	GGG	50 (2x)	—	50 (2x)	—	—
		ST	50 (2x)	50 (2x)	50 (2x)	50 (2x)	50 (2x)

GGG = Spheroidal graphite cast iron; ST = Steel

EBL = Rounded installation length of the thermowell in mm

Note that temperature measurement on measurement systems in the open air may be influenced by the ambient temperature. For this reason, the **metering elements** outside the pipe should be **adequately insulated** against ambient temperature influences. In order to achieve optimum thermal conduction, you should also always fill the thermowell(s) with a heat-conductive fluid or paste.

If no temperature test points in the meter housing are scheduled, the **temperature must be measured** in the pipe **downstream of the turbine gas meter** at a distance of up to 3 x DN, but max. 600 mm away.

10. Index Versions

The meter can be equipped with various index versions:

Index S1

- This is the standard version with an 8-digit mechanical roller index.
- Provides universal read-off.
- Can be rotated up to 355° about its axis.
- Suitable for outdoor installation.
- Designed for LF pulse generators which can be plugged on from the outside and which can be exchanged on site.



Index S1V (optional)

- This has the same features as index S1.
- The mechanical roller index can be read off from the top.



Index MI-2 (optional)

- This has the same features as index S1 or S1V.
- Aluminium cover.
- Can be optionally fitted with a mechanical index drive pointing upwards or backwards in accordance with EN 12480.
- Designed for LF pulse generators which can be plugged on from the outside and which can be exchanged on site.
- Fitted with a dessicant cartridge.

The service life is dependent on the conditions of use (minimum service life 12 months).

Replace the dessicant cartridge if the colour has changed from blue to pink.



Absolute ENCODER S1D (optional)

- This has the same features as index S1.
- Can be used as **main index on gas meters**.
- Available as a top-mounted unit (transmitter unit) on meters with mechanical index drive (MI-2).
- The encoder is suitable for connection to a series-connected additional device (volume corrector, data logger or bus system) in potentially explosive atmospheres (see table: Technical Data). A device connected to the terminal box must feature at least the following approval as an associated apparatus for this:
[EEx ia IIC] for version with Namur interface,
[EEx ib IIC] for version with SCR/SCR+ interface.
 The version with M-BUS interface is not ATEX approved.

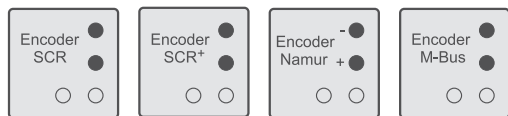


Connection of the Absolute ENCODER S1 unit to the mechanical index drive of the meter

- Connect the connector of the top-mounted unit to the mechanical index drive of the driving unit (e.g. MI-2, ensure the steel disc is removed from the connector).
- Use a locking screw to secure the encoder top-mounted unit against pulling out.
- The locking screw must be lead-sealed for applications requiring mandatory calibration.
- If you wish to synchronize the encoder with the meter reading of your operating meter after installation or conversion, you will require the Instructions “Encoder synchronization” and a special tool. In such cases, we recommend contacting our **Elster-Instromet Customer Service (Tel. +49 (0)6134-605-0 / -346)**.

Connection of the encoder

- Use only a screened cable (DIN EN 60079-14) to connect the encoder and ensure that the pin assignment is correct (see sticker next to the cover of the terminal box).
- When connecting the Namur interface, ensure that the 2-wire connection has the correct polarity. The M-Bus and SCR/SCR+ interfaces are independent of the polarity.
- It is possible to apply screening and to run a cable to the meter housing or the pipe. Make sure to check in advance that the grounding system used allows grounding on both sides (ground loops and potential difference in grounding).



Encoder sticker

11. Commissioning

For meters **without oil pump**: continue with point “Placing the system into operation”.

Meters **with oil pump** must be provided with initial lubrication.

Before commissioning:

- First open the **cover** on the oil supply tank.
- Fill the oil supply tank with the supplied **oil**.
- The **oil quantity** is sufficient when the oil level reaches around $\frac{3}{4}$ of the tank volume.
- Operate the **oil pump as instructed in section “Maintenance and Lubrication”** and only then close the oil supply tank.

Placing the system into operation

In order not to damage the meter,

- **slowly fill** the system until operating pressure is reached.
- The **pressure rise** may not exceed 350 mbar/s. You should also use a bypass line for filling (recommendation: 12 mm pipe diameter).
- Do not exceed the **measuring range** even briefly!
- Conduct a **tightness test!**

Important! Dirt particles, such as welding beads, swarf and other foreign bodies, may be contained in the gas for a short while after installation.

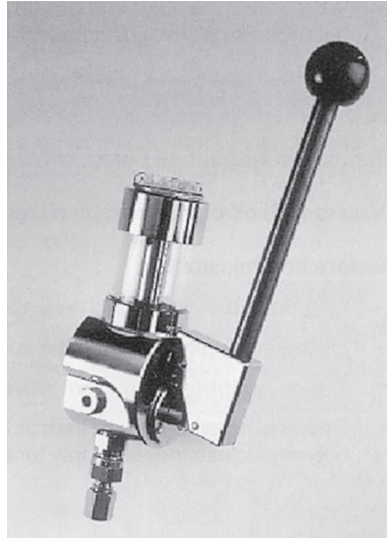
For this reason, always fit a coarse filter in order to avoid damage to the measuring unit. **Do not forget** to remove the coarse filter after approx. 4 – 6 weeks since, should it become saturated, this would produce an obstacle to flow.

12. Maintenance and Lubrication

Meters **without oil pump** are **maintenance-free**.

Meters **with oil pump** must be **lubricated**.

- You must **open the cover** of the supply tank before **operating the oil pump's** hand lever.
- Ensure that the supply tank has an adequate quantity of oil. Use the **filter insert** in the supply tank when topping up with oil.
- Operate the **oil pump by hand** by **fully pulling** the hand lever down applying uniform pressure. Note that one pull corresponds to one stroke of the pump's piston.
- After operation, you must **re-close** the **supply tank** firmly.



13. Decommissioning

Slowly decrease the pressure (max. 350 mbar/s).

Do not open the coupling until the operating pressure is zero.

Only remove the meter when the pipe has been depressurized.

Lubrication instructions for turbine gas meters and quantometers in the case of dry natural gas
DN 50 – DN 150
4 – 6 strokes every 3 – 4 months
10 strokes on commissioning (initial lubrication)
Permitted lubricants: Shell Risella 917, Shell Tellus T 15
Other non-resinous and non-acidic oils with a viscosity of approx. 30 cStokes at 20°C, solidification point lower than -30°C, or equivalent oils may be used. For special gases such as propane or butane, or in the case of difficult operating conditions (e.g. full load or contaminated gases), the lubrication intervals should be halved (4 – 6 strokes every 1.5 – 2 months).

Important: Always fill the supply tank with oil in good time to prevent air entering the pipe system.

Protect the oil pump against the ingress of water by keeping the oil tank firmly closed.

14. Care, Cleaning and Spare Parts

Clean off dirt on the meter only with a damp cloth.

Any media gentle on the relevant materials can be used as cleaning media.

Maintenance is carried out by the manufacturer (or by authorized workshops). Only original Elster spare parts may be used.

15. Recycling and Environmental Protection

Elster-Instromet has reduced the transport packagings of its measuring instruments to the bare essentials. Packaging materials are always selected consistently with a view to recycling. The cardboard items used constitute secondary raw materials for the paperboard and paper industry. The Instapak® **foam packaging items** are **recyclable** and can be **reused**.







Plastic sheeting and strips/bands are also made of recyclable plastic. At Elster-Instromet, subsequent recycling and disposal are already elements of the product development process. When selecting the materials, we allow for reusability of the materials, suitability of materials and sub-assemblies for dismantling and separation, and the risks of environmental pollution and health risks when recycling and dumping on landfill sites. The turbine gas meters and quantometers mainly consist of metallic materials which can be melted down again in steelworks and metallurgical plants and which can thus be reused a virtually unlimited number of times. The plastics used are listed in Annex B so that sorting and separating of the materials for the purposes of subsequent recycling is possible.

Transport:

- For meters without oil pump: drain the oil.
- Protect the meter against transport damage.

16. Annex A

The pulse generators used in turbine gas meters have their own ATEX approvals (Ex approvals) and are marked in accordance with the table below:

Pulse generator type	Designation of the sensors	EC type-examination certificate Directive 94/9/EC Identification of pulse generators	Manufacturer
LF pulse generator IN-S.. XX	Reed contacts: KSK-1A81-0810 KSK-1C97-1020 2322 KSK-1B90U- BV09904	TÜV 03 ATEX 2123 Ex marking:  II 2 G EEx ia IIC T4	Elster GmbH 55252 Mainz-Kastel Germany
IN-W11	Wiegand sensor: Series 2000 magnetic sensor	FTZÚ 04 ATEX 0277 Ex marking:  II 2 G EEx ia IIC T6/T4 TÜV 01 ATEX 1776 Ex marking: II 2 G EEx ia IIC T4	Elster s.r.o. 91601 Stará Turá Slovakia Elster GmbH 55252 Mainz-Kastel Germany
HF pulse generator A1 R, A1 S	Inductive proximity switch: N 95000	PTB 01 ATEX 2192 Ex marking:  II 1 G EEx ia IIC T6	IFM Electronic GmbH 45127 Essen Germany
	Inductive proximity switches: NJ 1,5-10 GM-N NJ 1,5-8 GM-N (old version) (both versions with identical electr. system) *) NJ 3,5-12 GK-N (old version) (same electr. system as NJ 4-12 GK-N) NJ 1,5-6,5-N (TRZ DN 50 only)	PTB 00 ATEX 2048 X Ex marking:  II 1 G EEx ia IIC T6 PTB 00 ATEX 2048 X Ex marking:  II 2 G EEx ia IIC T6* *) NJ 3,5-12 GK-N	Pepperl + Fuchs GmbH 68307 Mannheim Germany Pepperl + Fuchs GmbH 68307 Mannheim Germany
Absolute ENCODER S1	Encoder system	TÜV 04 ATEX 2544 Ex marking:  II 2 G EEx ia/b IIC Ta	Elster GmbH 55252 Mainz-Kastel Germany

17. Annex B

Plastics used in turbine gas meters and quantometers, see also section 15 "Recycling and Environmental Protection".

Plastic parts	Abbreviation	Chem. name
Pulse generators	PA 6.6	Polyamide
Flow straightener	PAMXD6	Polyarylamide
Gears and small parts	POM	Polyoxymethylene
Index cover and index	PC	Polycarbonate
Index base	PPA	Polyphthalamide
Digit rollers	PA 12 PPO	Polyamide Polyphenylene oxide



Declaration of Conformity
Konformitätserklärung



Product
Produkt

Gas Meters – Turbine Gas Meters
Gaszähler – Turbinenradgaszähler

Type, Model
Typ, Ausführung

TRZ2 G 65 – G 1000

Product Marking
Produkt-Kennzeichnung

MID	PED	ATEX
CE Mxx 0102 DE-09-MI002-PTB001	CE 0085	II 2 G c IIC T4
2004/22/EC 2004/22/EG	97/23/EC 97/23/EG	94/9/EC 94/9/EG
EN 12261	EN 12261	EN 13463-1 EN 13463-5
Notified Body 0102 Physikalisch-Technische Bundesanstalt (PTB) D-38116 Braunschweig	Notified Body 0085 DVGW D-53123 Bonn	
Notified Body 0102 2004/22/EC Annex D 2004/22/EG Anhang D	Notified Body 0085 97/23/EC Annex D 97/23/EG Anhang D	

EC Directives
EG-Richtlinien

Standards
Normen

EC Type-Examination
EG-Baumusterprüfung

Surveillance Procedure
Überwachungsverfahren

We declare as manufacturer:

Products labelled accordingly are manufactured according to the listed Directives and Standards. They correspond to the tested type samples. The production is subject to the stated surveillance procedure. No additional ignition sources are created by assembly of the product's components.

Wir erklären als Hersteller:

Die entsprechend gekennzeichneten Produkte sind nach den aufgeführten Richtlinien und Normen hergestellt. Sie stimmen mit dem geprüften Baumuster überein. Die Herstellung unterliegt dem genannten Überwachungsverfahren. Durch den Zusammenbau der Produktkomponenten werden keine zusätzlichen Zündquellen erzeugt

12.04.2010

Head of Segment GGM
Leiter Geschäftssegment GGM

Head of R&D Industrial Gas Metering
Leiter Entwicklung GGM

Elster GmbH, Postfach 1880, D – 55252 Mainz-Kastel, Steinern Straße 19-21



Declaration of Conformity
Konformitätserklärung



Product
Produkt

Gas Meters – Quantometers
Gaszähler – Quantometer

Type, Model
Typ, Ausführung

Q / QA / QAe

Product Marking
Produkt-Kennzeichnung

PED	ATEX
CE 0085	II 2 G c IIC T4
97/23/EC 97/23/EG	94/9/EC 94/9/EG
EN 12261	EN 13463-1 EN 13463-5
Notified Body 0085 DVGW D-53123 Bonn	
Notified Body 0085 97/23/EC Annex D 97/23/EG Anhang D	

EC Directives
EG-Richtlinien

Standards
Normen

EC Type-Examination
EG-Baumusterprüfung

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12.4.2010

Head of Segment GGM
Leiter Geschäftssegment GGM

Head of R&D Industrial Gas Metering
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