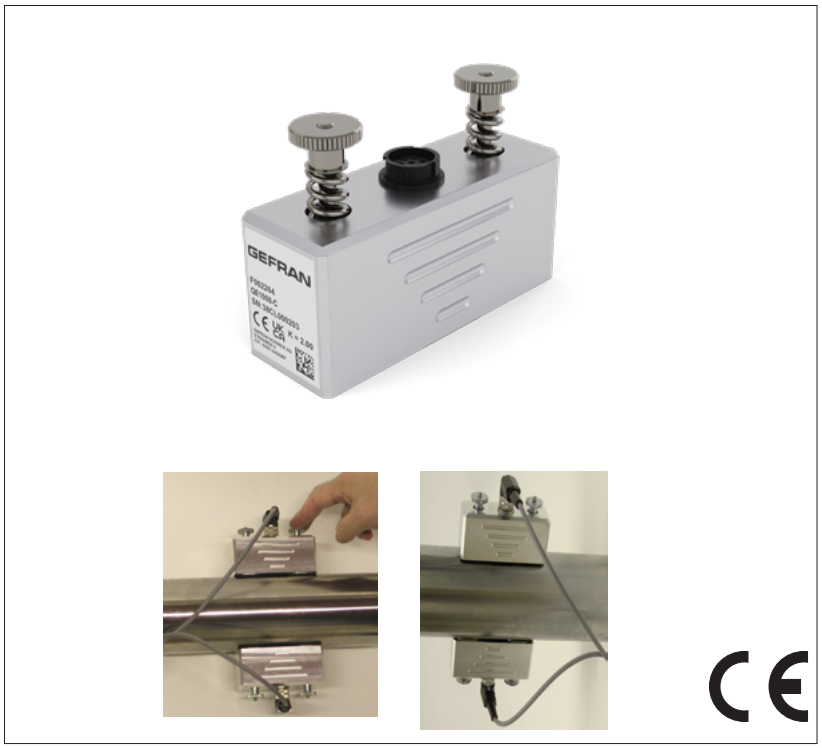
GEFRAN

QE1008

MAGNET MOUNT STRAIN SENSOR



INSTRUCTION MANUAL

Edition 02/2014

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1. Description

1.1 Introduction

The magnet-strain sensors type QE-1008 are latest generation extensometers with two integrated super magnets to measure the bending compensated tie-bar elongation and/or load (→ load: if two extensometers are used on one tie bar).

The improved design does not only make the sensor shorter, but also increases the absolute accuracy. Therefore all the sensors are interchangeable.
This makes the measurement and check of the following parameters even easier:

- ***Tie bar load distribution***
- ***Clamping force measurement***
- ***Elongation- and strain measurement on any flat surface (e.g. mould platen)***

Advantages of this system:

- Very high accuracy: <1% absolute (like bonded strain gauges)
- Safe against machine vibration and shock (like the strain rings)
- One system for all tie bar diameters
- Measures also reliable on flat surfaces
- 2 sensors for bending compensated measurements
- Quick & easy mounting
- Digital monitor with direct Force/Load display (kN/t)
- Optional software available (according to ISO9001/Euromap)
- Comes in carrying case with 2, 4 or 8 extensometers
- Light and handy case

One system for the high tech molding shop.

1.2 Technology

The extensometer QE-1008 is based on pressed-on strain gauges. This successful technology is used in many products for the molding industry.

The pressed-on strain-gauge is placed under a stainless steel foil between the two magnets.
The strong magnets press the strain gauge that strong onto the surface of the tie bar that friction occurs between the strain gauge, the foil and the tie bar.
This friction replaces the usually used strain gauge adhesive that means easier application with the same results, but without bonding.

Finally this technology allows highly accurate tie-bar elongation-measurement with fast and reliable mounting.

The sensors are basically magnet mounted and reusable strain gauges which measure strain on cylinders or flat surfaces.

2. Technical data

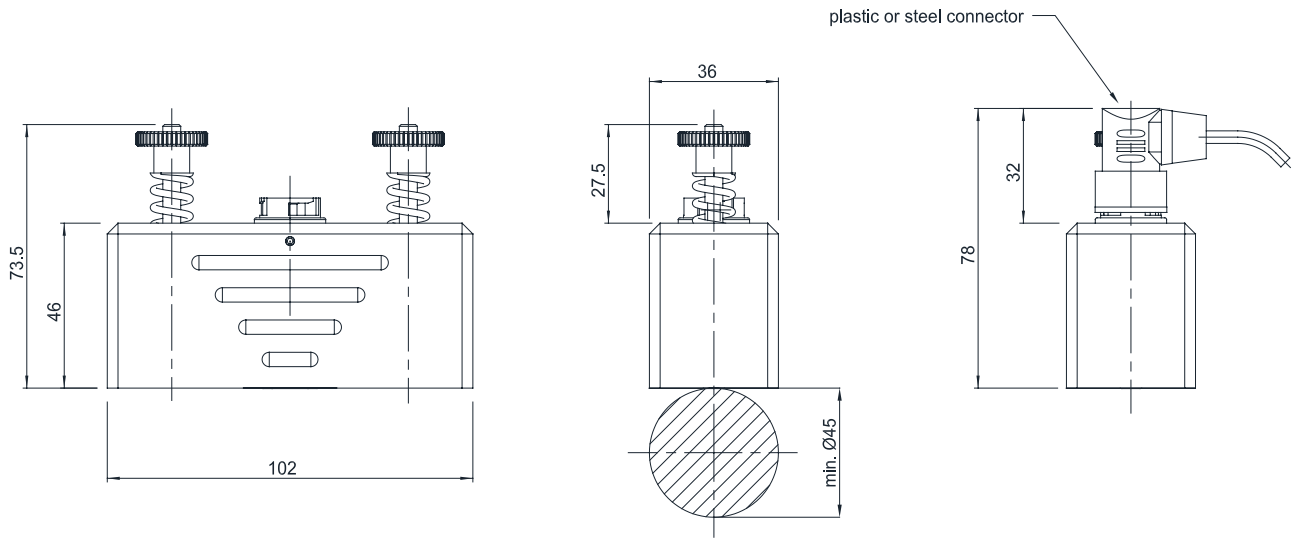
2.1 Sensor

Strain gauge type	Foil (GF = 2.0)
Bridge resistance	350Ω
Measuring range	± 800 με
Sensitivity tolerance	± 0.2%
Transverse sensitivity	0.9 ± 0.2 %
Accuracy	< ±0.5% FS
Linearity	< ± 0.5% FS
Hysteresis	< ± 0.5% FS
Repeatability	< 0.2% FS
Nominal input resistance	350Ω
Supply voltage	2.5VDC (5VDC max)
Supply current	< 8mA
Operating temperature range	5...50°C
Storage temperature range	5...50°C
Overload capability	indefinite (offset occurs)
Protection class	IP54
Case material	Aluminium
Weight including cable	530g
(FS = full scale = max. measuring range)	

2.2 Display unit

see separate data sheets

Changes of the technical data to improve the performance can be made anytime without prior notice.

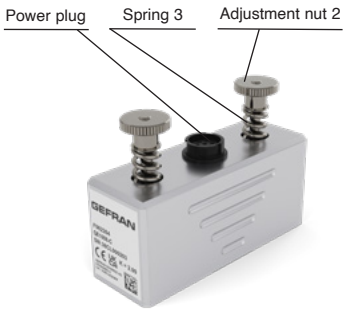


3. Instructions

IMPORTANT:
These sensors are sensitive measuring instruments with a resolution of 0.001 mm (i.e.0.000004 mm respective to the gauge length).
Please handle this instruments with the respective care. These instructions have to be read carefully by any user prior to application.

Mounting of the magnet sensors

(see also separate instruction with pictures)



3.1 Preparation

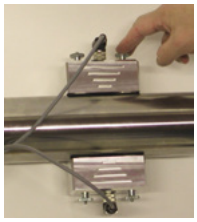
Connect the cable to the sensor.
Clean the mounting spot from oil, loose parts, paint and other parts on the surface
The area where the foil is being placed must be even that the foil is not damaged.
All sensors have the same sensitivity, so there is no need to match them during mounting.

3.2 Installation

Set the sensor carefully onto the tie bar at a location where another sensor can be set 180° opposite.
(Important: position should be at least one time the diameter away from the fixed platen; i.e. homogeneous strain distribution is guaranteed for comparable results).

3.3 The magnets hold the sensor already on the surface. This allows easy shifting until the sensor can be installed at the desired location.

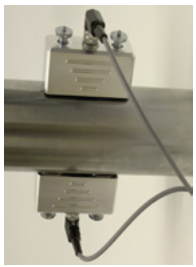
3.4 Press now slowly and carefully one magnet after the other down, until it jumps onto the structure.
Turn now the adjustment nut just as strong that the magnet does not jump off = maximum magnet force.

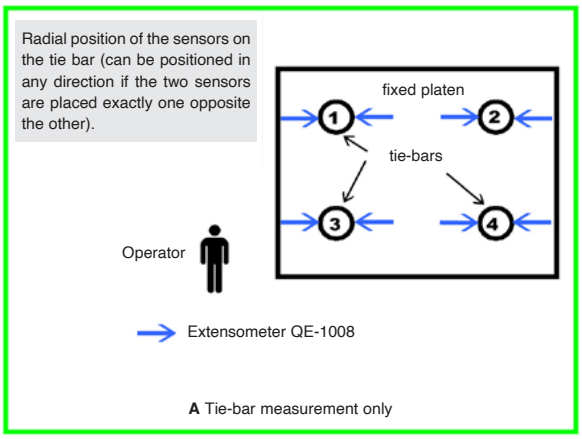


3.5 If the magnet jumps off, then the spring force is too high. Loosen the adjustment nut 2 that the spring 3 is loosened (e.g. one rotation of the mounting nut counter-clockwise).

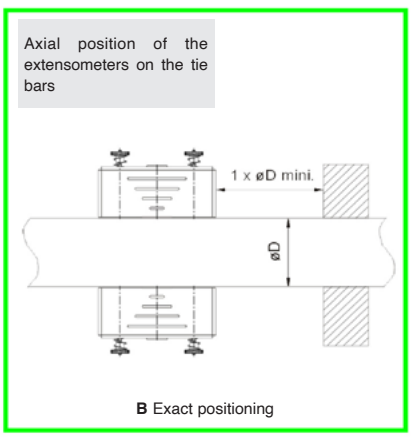
3.6 CHECK: The sensor shall not move if you try to shake it slightly. The machined edges of the magnet-groove need to be in contact with the tie bar on the whole length.

3.7 Now it is time to mount the second sensor opposite on the tie bar (see picture A on the following page).
The sensors can be mounted in any angle – but in any case exactly one opposite the other.
Remark: Only when two sensors are more than 8 degrees off the correct opposite position, then an error >1% of the measuring value occurs!





A Tie-bar measurement only



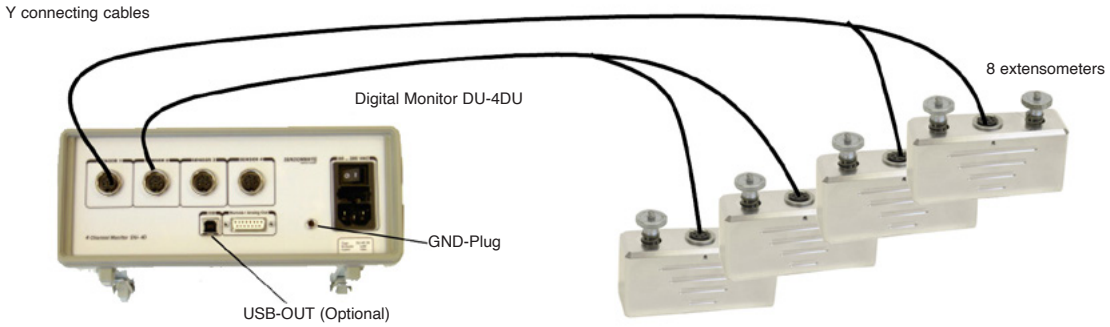
B Exact positioning

4. Measuring of load distribution

(= load on each single tie bar)

4.1 Connect the sensors with the ‚Y'-cables to the digital monitor DU-4/D. The tie bar cable 1 should be connected to input 1 etc., switch on the monitor and push 'RESET'.

4.2 Open and close the machine 2...4 times and press 'RESET' between each cycle. The effective, precise measurement can take place as soon as approx. 1...3 digits offset remain.
The magnet sensors have now settled and are ready for measurements.



4.3 The displayed values are bending compensated, because the measuring values of the two opposite sensors are averaged at the input.
The displayed microstrain (με) values are the tie bar elongation. Example:

Display 355 = 0.355mm tie bar elongation per meter of tie bar

With this value, the clamping force can be calculated.

The new DU-4DU digital monitor calculates by push-button directly kN or tons.

5. Measuring the tie bar bending for early tie bar fraction diagnosis

With this sensors, the bending of two tie bars can be measured simultaneously, without additional equipmant necessary.

Procedure:

5.1 Place the 1. sensor onto the tie bar (45° angle)
5.2 Connect to the same Y-cable a 2nd sensor, don't place it onto the tie bar, leave it open. Connect the Y-cable to the sensor-input one of the DU-4D monitor
5.3 Set the 3rd sensor (180° opposite) and connect it to a 2nd Y-cable
5.4 Connect to the 2nd Y-cable also a QE-1008 sensor, but leave it open and do not place it onto the tie bar
5.5 Connect the 2nd Y-cable on sensor-input two of the monitor
5.6 Proceed now as with standard measurement: display 1 shows now the outer and display 2 the inner elongation
5.7 A 2nd tie bar can be displayed at the same time on display 3 and 4

The elongation shown is a superposition of load and bending. Very high differences of both values (e.g. <250με versus >700με) can be an indication that the tie bar has started cracking.

Theoretical display on how to measure the tie bar bending: one sensor has no load. Make sure that this open sensor is not exposed to temperature variations.

6. General hints

- Do not close the machine with highest speed, as this may cause offset because of the strong vibration.
- If the display does consistently not display zero after releasing the reset button, (e.g. if it displays values between approx. +25 to -25), that means very often, that ground electrical loops exist on the machine. To avoid this, connect the ground of the display box or the monitor with the included black cable and clamp to the machine ground or the platen.
- Compatibility: the QE-1008 are fully compatible (= generate the same signal) as bonded strain gauges, strain rings or strain clamps.

7. Calibration intervalls

This measuring instrument should be calibrated every 12 months. The sensors, monitors and cables should then be sent to the manufacturer.
If the foil is damaged, or the 350 Ohm can not be measured anymore, then the sensor has to be sent back for repair or overhaul and calibration.

RECOMMENDATION: If the extensometers are used heavily, then we recommend to purchase one or two sensors more then actually necessary. This assures that the system can still be used even if one sensor is out of order or currently at the factory for calibration.

Thank you very much that you have chosen our products and services. We are improving our products continuously. If you have any hints for further improvements of our products, please contact us.
Check also our homepage for further information

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