



DQM 3 + DGM DIGITAL CROSS-SECTION MEASUREMENT SYSTEM

- ✔ HIGH-PRECISION HAND-HELD MEASURING INSTRUMENT
- ✔ ROBUST, STURDY CONSTRUCTION
- ✔ POWERFUL BATTERY DELIVERS HOURS OF SERVICE, NO MAINS CONNECTION REQUIRED
- ✔ USER-FRIENDLY OPERATION VIA EXTERNAL TABLET PC
- ✔ MEASURED DATA ACQUISITION VIA BLUETOOTH TECHNOLOGY, WITH REAL-TIME TRACKSIDE EVALUATION



DQM 3 DIGITAL CROSS-SECTION MEASUREMENT SYSTEM



1 Description

The DQM is a compact, portable hand-held measuring instrument for the **accurate recording of rail head sections** at the trackside. Its robust construction allows the DQM to be used under even the most extreme conditions. With over 100 systems in use worldwide, this tried and trusted design has a proven track record for reliability.

FEATURES

- » **Sturdy construction** Robust all-metal construction for daily use in a challenging track construction environment
- » **Compact and portable** Hand-held instrument is quick to deploy and light to carry
- » **Maximum precision** High-quality components ensure precision smaller than $50\mu\text{m}$
- » **Mains-free** Built-in easy-change battery lasts for at least 250 measurements to provide mains-free outdoor operation
- » **User-friendly** Multilingual menu-driven operation, wireless connection to tablet PC
- » **Trackside real-time evaluation** Instant and simple evaluation and analysis of measurements obtained. Complex evaluation processes can also be performed.

ASSEMBLY

The DQM and all its components are packaged in a carrying case. The track stop and boom are mounted on the measuring head, which forms the heart of the measuring equipment. Mounting is via centring cones and star grips. Once all components are connected and the tablet PC activated and in measurement mode, the measuring instrument is ready for operation. Despite splashproof construction

using top-quality system components, we recommend the measuring instrument be protected in extreme weather conditions.

MEASURING PROCEDURE

The service-ready DQM is controlled via the connected tablet PC. The software allows the option of recording the gauge of the target cross-section as well as local features along the stretch of track (km, pylons, points, etc.) Once all the entries have been made, the tablet PC transmits the measurement command. Measurement is automatic. A motor draws the securely mounted measurement sensor across the rail from the outside edge of the rail to the running edge. Simultaneously the vertical movements of the sensor are recorded, processed in the measuring instrument, transmitted to the tablet PC and evaluated in real-time. Following measurement the sensor automatically returns to its original position.

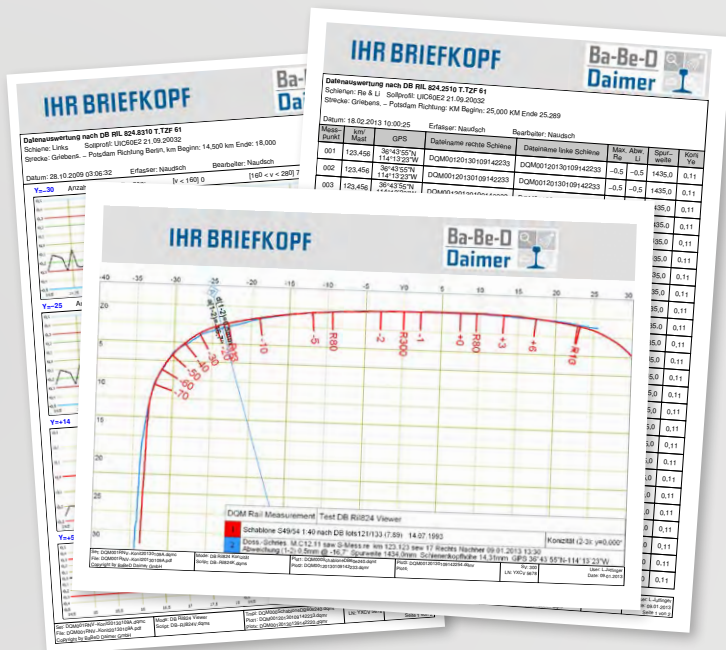
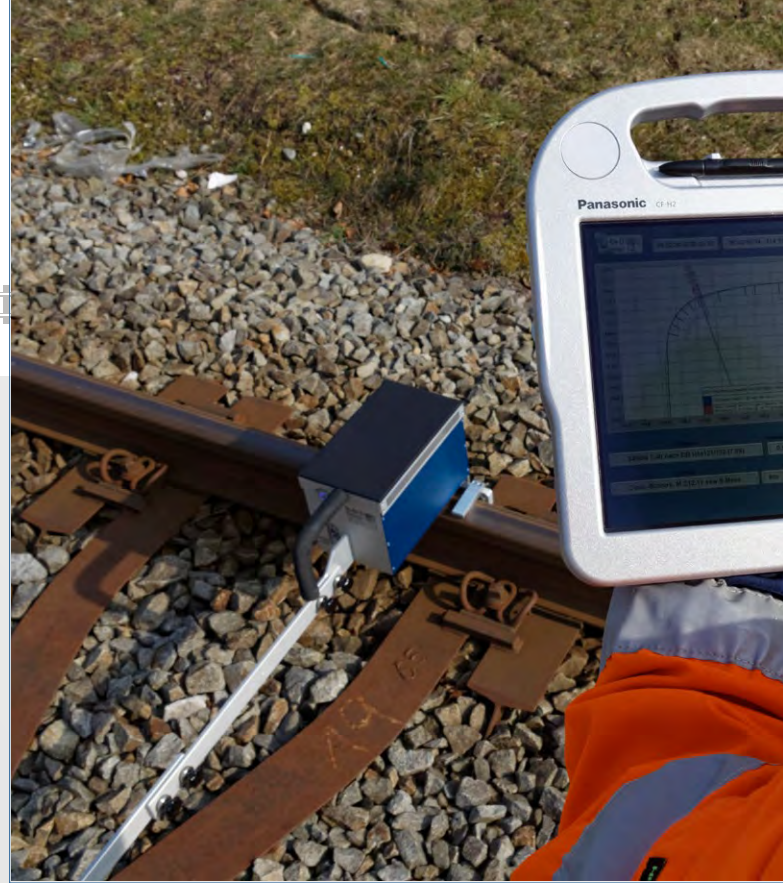
REAL-TIME EVALUATION

ADDITIONAL EVALUATION

Windows®-based evaluation software enables traditional data acquisition to be combined with real-time trackside evaluation. This means the user can see during the measurement process whether the cross-section is compliant with specification. In addition to the track section data, the GPS coordinates of each measurement are stored. A structured archive can be readily created from the extensive positional data. Several modules are available for evaluating more complex measurement tasks. Measured data can be exported in a wide variety of formats.

TECHNICAL DATA FOR DQM3

- » horizontal measuring range up to 100.0 mm
- » horizontal resolution 0.1 mm
- » vertical measuring range 35.0 mm
- » vertical resolution 0.01 mm
- » measurement uncertainty (95% CF) < 0.05 mm
- » measurement time (max. measurement range) approx. 18 s
- » return time (maximum) 6 s
- » energy consumption (on standby) 0.25 A
- » energy consumption (during measurement) 0.49 A
- » battery type/battery capacity NiMH 12 V / > 3.5 Ah
- » coverage (measurements/battery charge) min. 250
- » operating temperature range -10 °C to +35 °C
- » weight approx. 9 kg
- » total weight (incl. case) approx. 20 kg



UNDERSIDE OF MEASURING INSTRUMENT WITH SENSORS

HEAD HEIGHT MEASUREMENT (OPTIONAL)

Rail head height can be measured using the mechanism incorporated into the DQM measuring head. When not in use the sensor is held in the retaining shoe on the base plate. If head height measurement is required the sensor is released, rotated through 180° and affixed to the underside of the rail head before recording of the cross-section. The measuring mechanism relays the movement to a laser sensor built into the DQM measuring head. Mechanical scanning means the laser makes no direct contact with the rail, ensuring no errors result from bumps or other factors.

TECHNICAL DATA

- » measuring range 30 mm
- » resolution 0.02 mm
- » measurement uncertainty < 0.05 mm
- » laser class 2
- » laser energy consumption < 100 mA
- » operating temperature range 0°C to +30°C

PRODUCT CONTENTS:

- » DQM3 measuring head
- » boom with tensioning hooks (selectable track gauge) and track stop
- » battery and charger, USB cable, manual
- » outdoor tablet PC (Panasonic Toughbook)
- » carrying case



1 Tablet PC (Toughbook)

We've chosen the Panasonic Toughbook family as the perfect partner for our DQM. The Windows®-based tablet PCs have an exceptionally bright Transflective-Plus LCD screen with Dual Touch. The batteries are hot-swappable, avoiding any down-time. With a wrist strap the light-weight tablets are easy to hold, and are vibration and shock resistant and tested to military standards. Additionally water- and dustproof to IP65, they are ideally suited to use in track laying operations. The integral GPS receivers supply the locational information for measurements, while any unexpected rail defect can be documented by built-in cameras. The powerful LTE module allows permanent synchronisation of the measuring results with various cloud services.

1 Optional accessories

A SELECTION FROM OUR AVAILABLE ADD-ONS. WE'D BE DELIGHTED TO COME UP WITH FURTHER SOLUTIONS FOR YOUR PARTICULAR REQUIREMENTS.

DGM – DIGITAL GAUGE MEASUREMENT SYSTEM

The DGM replaces the traditional tensioning hooks with ones incorporating a laser measuring head. Track gauge is then recorded together with the cross-section.



HHM HEAD HEIGHT MEASUREMENT SYSTEM

The HHM is incorporated into the base plate of the DQM3 measuring head. The mechanism is moved by hand to the underside of the rail head. The laser built into the DQM3 measures the movement of the measuring mechanism and records the measured value.

PLOTTER CASE

The mobile plotter case comprises a portable, battery-powered inkjet printer and a docking station for the tablet PC. The components within the case are charged via a central plug.



» Additional accessories, such as replacement batteries, wrist straps, carrying solutions, etc. designed specifically for the tablet PC are available on request.

DGM DIGITAL GAUGE MEASUREMENT SYSTEM

Overview

The DGM—Digital Gauge Measurement System is an optional accessory for DQM cross-section measurement systems. The DGM is designed to measure track gauge while recording the cross-section. The track dimension is measured with a precision laser 14mm below the rail running surface. The measured values obtained are sent directly from the DQM measuring head to the tablet PC for further processing.

FEATURES

- » Simple mounting onto boom
- » Digital measurement
- » Direct transmission of data to measuring head

TECHNICAL DATA

- » measuring range 50 mm
- » resolution 0.1 mm
- » measurement uncertainty <0.5 mm
- » laser wavelength 675 nm
- » laser energy consumption <100 mA
- » laser protection rating IP 67
- » operating temperature range 0°C to +30°C

ASSEMBLY

The DGM is mounted on the end of the boom, replacing the DQM's tensioning hooks. Once the data line is connected, the measuring instrument is ready to operate.

MEASURING PROCEDURE

Track gauge is measured in parallel with recording of the cross-section. If the measuring head is already set-up for using the DGM, it automatically recognizes this and integrates it into the measuring procedure. The track gauge measured with the laser distance sensor is transmitted to the tablet PC via the DQM measuring head. Correction is made for the material-specific linear expansion and the track gauge value then stored in the cross-section measurement file.

STORAGE

The measured track gauge is sent via Bluetooth from the DQM measuring head to the tablet PC, linked with the cross-section measurement and stored on the hard disk.

EVALUATION

The recorded track gauge is evaluated by the Windows®-based DQM Professional software. The measured track gauge is displayed

on the profile printout and can be digitally exported for further analysis.

CONICITY PROGRAM

The computation program developed by Deutsche Bahn AG for determining equivalent conicity is combined with our software »DQM Professional«. For maximum ease of use, the command for calculating equivalent conicity is executed directly via the software. In accordance with DB Group guideline 824.2510, the calculated conicity value is compiled into a tabular evaluation chart. The associated profile pressure is also available here. These values describe the lateral acceleration of the train (a carriage) while running over the track. German high speed lines are divided into different classifications of equivalent conicity. For rail and track renewal the DQM3 measurements are calculated with the conicity value as output. The compliance with the limit values reaffirms the approval of the maximum permissible line speed.

DATA ANALYSIS
IN ACCORDANCE
WITH DB RIL 824.2510



IHR BRIEFKOPF										Ba-Ba-D Daimler		
Datenmessung nach DB RIL 824.2510 + TZF 41												
Schnellzug, Gleis: 11, Station: UIC9002 1.100.0000												
Datum: 18.03.2013 16:00:07												
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020	123.456	100.000	DQM3001	10.000	0.000	0.000	123.456	10.000	0.000	0.000	123.456	10.000



Overview of our services

- » *Measurement technology (development, manufacture, sales and servicing of measuring instruments for track measurement)*
- » *Consultancy for wheel/rail systems*
- » *Measurement services using our own equipment*
- » *Cleaning of tracks, points, track drainage and railway systems*
- » *Track-side equipment and safety devices in tunnels*
- » *Fire prevention along railway lines*

Since 1980 we have been providing wheel and rail solutions to rail constructors and operators, as well as for rail profile maintenance. Our many years' experience of working closely with customers in a spirit of trust enables us to quickly develop solutions that are individually tailored to customers' needs.



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Ba-Be-D Daimer is certified in
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