



DMM – Deflection Multi Meter

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The DMM system measures vertical deflection from many locations, in real-time, utilizing optical reference level created by a rotary laser level. The multipoint measurement capability with a 10 Hz sampling rate of a normal rotary laser level makes it unique compared to other measurement equipment, such as a total station theodolite. The DMM system can be applied for measuring bending of main girders during a bridge loading test or for long-term monitoring of various structures, for example.

Serially connected DMM units send measurement results to computer using a RS-485 data bus cable, which also serves power for the system. Communication between a DMM and a computer utilizes the MODBUS protocol which enables an easy connection to existing measurement systems.

Optionally a DMM unit includes also bi-directional tilt and acceleration sensors and three input channels with 24-bit A/D converters for external voltage or current output sensors, such as a strain gauge or a displacement sensor.

In many applications it is possible to utilize super magnets or clamps for fixing, which makes the DMM system very flexible and easy to assemble.



DMM products



DMM unit



DMM cable



Adjustable fixing bracket with clamps

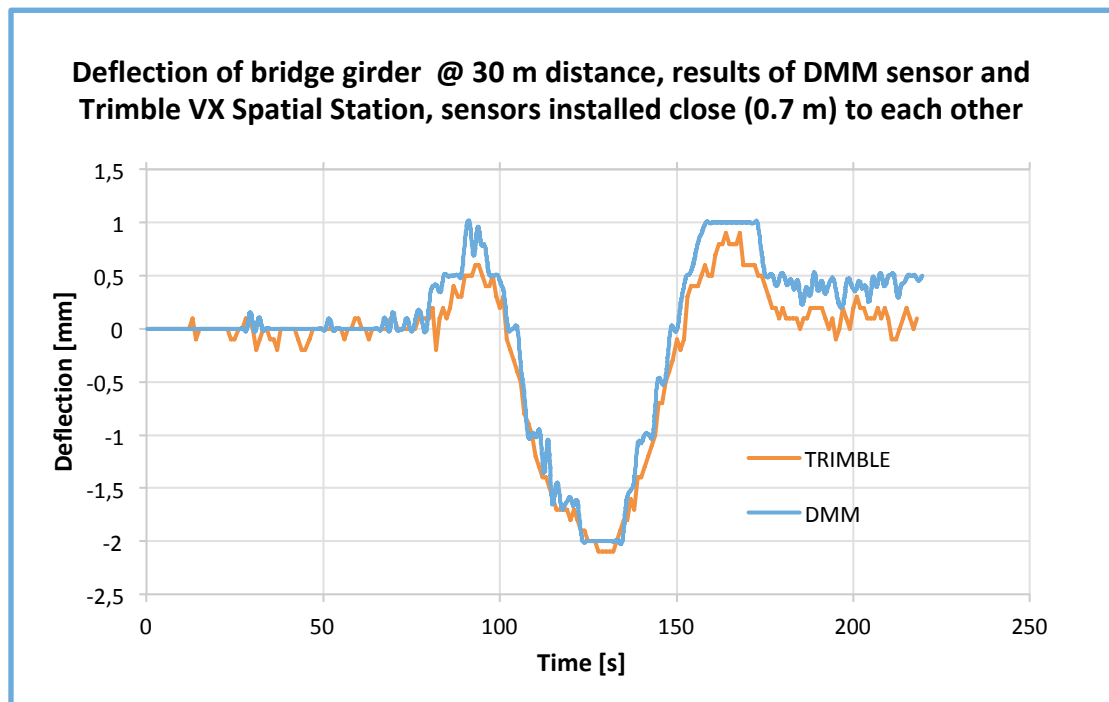


Adjustable fixing bracket with magnets

Application photographs



Four DMM sensors measuring deflection of main girders.



Technical performance

Deflection sensor DMM D1, DMM D1S and DMM ER:

Resolution	0.5 mm (single shot)
Nonlinearity	+/- 0.25 mm
Sampling rate	1-10 Hz
Measurement range	160 mm , 320 mm with DMM320
Measurement distance 600 rpm/10 Hz),	350 m (DMM ER and DMM320, with GL700-series laser, 100 m (DMM D1 and D1S, with HV302 laser, 600 rpm/10 Hz)
Number of DMM units in one data bus	1 – 20
Operating voltage	7.5 – 36 V measured at the input connector
Current consumption	170 mA
Data bus	RS-485 (MODBUS)
Dimensions and weight	71 x 64 x 215 mm (D x W x H), 1.56 kg (DMM D1,D1S,ER)
Enclosure material	Aluminum, EN AW 6082, window PMMA 3 mm
Connector type	MIL-5015
Operating temperature	- 20 °C ... +50 °C

Rotary laser level:

Rotating speed	60-600 rpm (pulse frequency 1 Hz – 10 Hz)
Laser type	Class 2/3A/3R, 620 nm-850 nm, 1 mW – 5 mW

Optional internal tilt sensor:

Resolution	0.01 ° (bi-directional, $f_{-3dB} = 1$ Hz)
Sampling rate	10 Hz (LP filtered, max 4.8 kHz)
Measurement range	± 45 °

Optional internal acceleration sensor:

Resolution	1 mg (x- and y-directions, $f_{-3dB} = 50$ Hz)
Sampling rate	100 Hz (LP filtered, max 4.8 kHz)
Measurement range	± 1.7 g

Optional external sensor inputs:

Number of input channels	3 pcs, voltage or current input
Resolution	24 bit
Sampling rate	4.8 kHz (max)
Measurement range	0 – 3.75 V or 4 - 20 mA

Optional measurement software and computer:

Computer operating system	Linux
System level data interface	TCP/IP with REST API