

Sening® MultiLevel

Level Gauging System



The Sening® Level Gauging System, MultiLevel, provides accurate volumetric measurement of petroleum product. The MultiLevel System increases transportation flexibility which makes distribution more cost effective. This is achieved by enabling simultaneous deliveries from all tank compartments at any time. The system's light-weight design provides tremendous operational benefits to increase fleet flexibility and efficiency.

Benefits:

- Dry line discharge measurement system
- Efficient light-weight design
- High discharge flow rate
- Simultaneously measured discharge from all compartments
- Minimum downtime for discharge at service station
- Software separated for Weights & Measures and control functions
- Software updates without breaking Weights & Measures seals
- Cost-effective calibration process with the mobile Sening calibration system
- System enhancement with NoMix cross-over prevention technology and MultiSeal monitoring functionality
- Connects to EPR systems with the EMIS communication interface



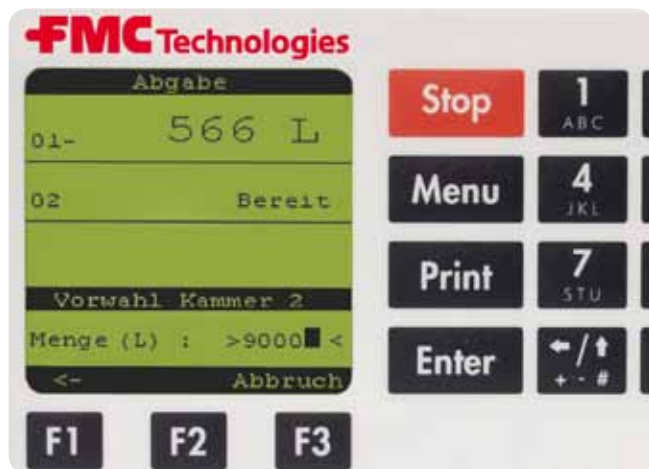
MultiLevel Function

MultiLevel is a system for measuring discharge volumes from single and multi-compartment petroleum road tankers. Each compartment is equipped with a level probe and sensors to monitor the liquid level, temperature, vehicle inclination, and retained product.

The high precision measuring process employs magneto-restrictive technology to the measuring probe. The technology has been proven through many years of reliable operation in service stations and other accurate level measurement installations.

FMC Technologies has enhanced the technology for applications in the harsh environment such as petroleum road tankers. In combination with the well proven Sening electronic modules from our NoMix and MultiSeal technology, MultiLevel provides the best combination of experience, reliability and performance.

The illustrations show some of many system functions such as discharge by volume preset, optional temperature compensation, and the generation of corresponding delivery documents.



MultiLevel Components

The Level Sensor

The level sensor is installed in the center of the compartment in a protective tube. The tube is supported at the tank top and the probe electronics are located in the sensor housing at the tank bottom.

The float traveling along the sensor probe has been specifically designed for the application and provides a measurement accuracy of ± 0.1 mm over a measuring range of 40 to 4,000 mm. This allows for the smallest amount of compartment-specific minimum discharge volumes.

The Compartment Specific Calibration Table

Each compartment has its own individual calibration table, which is established during calibration with FMC's mobile calibration unit. Intermediate values are calculated by applying proven mathematics. The discharged volume corresponds to the difference between measured levels before and after the delivery.

To correct the filling volume, the longitudinal and transverse tank inclination is measured over a range of up to $\pm 8^\circ$ by an inclination sensor. To maintain the measurement accuracy, inclination limits are set in the software to control the

Delivery Note

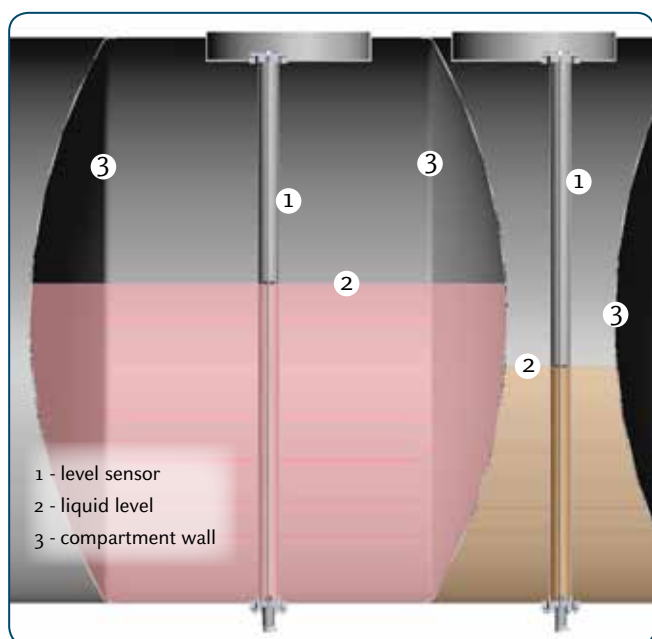
Start Date	:	01.09.2009
Tanknumber	:	* PM 8219 *
Receipt Nr.	:	* 160 *

 Data from W&M approved devices
 is enclosed in asterisks (*).

Comp. End	:	01 E
Start-End	:	11:45:04 - 11:51:00
Average Temp.	:	-14,5 °C
Product	:	* Diesel *
Start Account	:	* 0 Liter *
Vol. Dlv.T.	:	* 6332 Liter *
Vol. 15°C	:	* 6490 Liter *

Comp. End	:	02 F
Start-End	:	11:46:40 - 11:51:37
Average Temp.	:	+0,0 °C
Product	:	* Super Unleaded *
Start Account	:	* 0 Liter *
Vol. Dlv.T.	:	* 4912 Liter *
Vol. 15°C	:	* 5001 Liter *

measurement process. The inclination correction tables are calculated using a model of the tank compartment generated on our 3-D CAD system. Liquid wave motion is compensated in the MultiLevel software, which permits an exact measurement after an idle time of only 3 minutes. Surge movements are continuously compensated for by advanced calculations.



Section through tank truck with dome plate.
Arrangement of the level sensor in the center of the compartment.

Calibration

The tank compartment calibration is performed with our mobile calibration unit, which is specifically designed for an efficient calibration process. The calibration data is stored and transmitted to the vehicle system with a chip card.

The Sensors

MultiLevel utilizes various sensors for

- Determining the inclination and corresponding correction for vehicles standing on a slope
- Evaluating the liquid level within each compartment
- Measuring the liquid temperature in the pipe system during discharge
- Detecting retained volume in the pipe system before and after discharge

The Software

The MultiLevel software is separated into

- a Weights & Measures related section and
- a process and control related section

This allows users to download the non W&M-related parameters, using the printer interface. Within certain limitations and processes, the W&M-related section may also be updated via a software download through the printer interface. This procedure prevents breaking W&M seals and reduces cost for sealing.

Technical Data

Approvals

Weights & Measures: PTB-A4.5 (PBTWMS-4-411-06-12)
 Tested in accordance with OIML R80-1
 Explosion protection: ATEX II 2 G EEx m ia e IIB T4

Measurement range:

40 to 4,000 mm (1.58" to 157.5")

Measurement accuracy:

± 0.1 mm (0.004")

Inclination measurement (level sensor):

up to ±5°: calibrated W&M certified delivery
 ±5° to ±8°: measured delivery
 over ±8°: unmeasured delivery

Communication:

internal: CAN bus and TAG protocol
 external: EMIS interface
 (RS232, DOC-411)

Viscosity range of the medium to be measured:

≤ 20 mPa·s at 20° C (68° F)

Operating temperature:

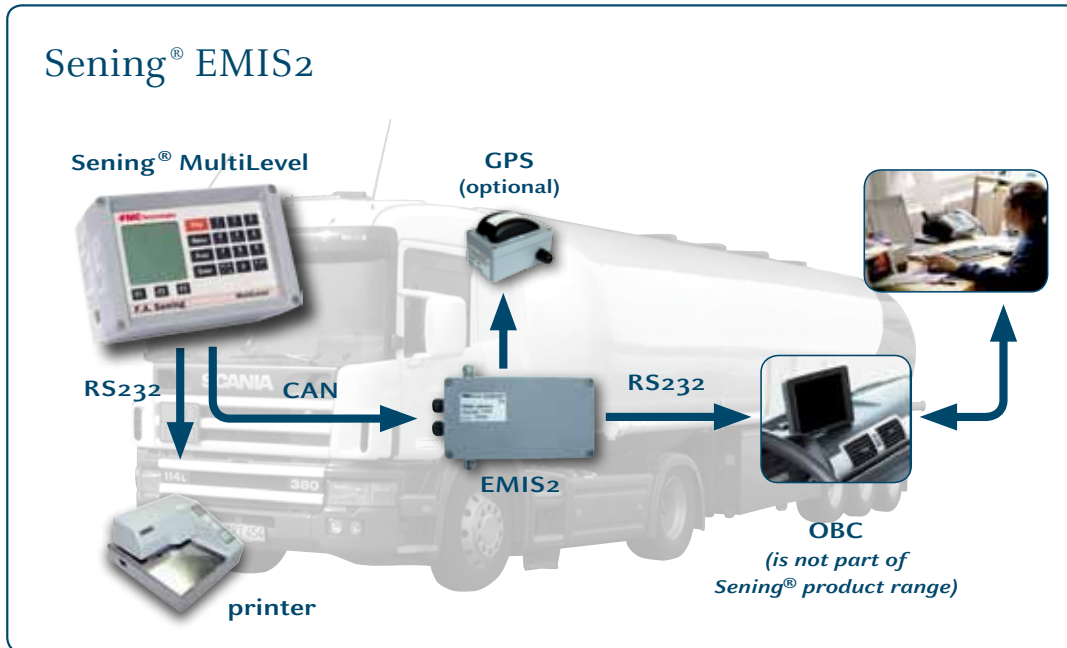
-20° C to +60° C (-4° F to 140° F)

Power supply:

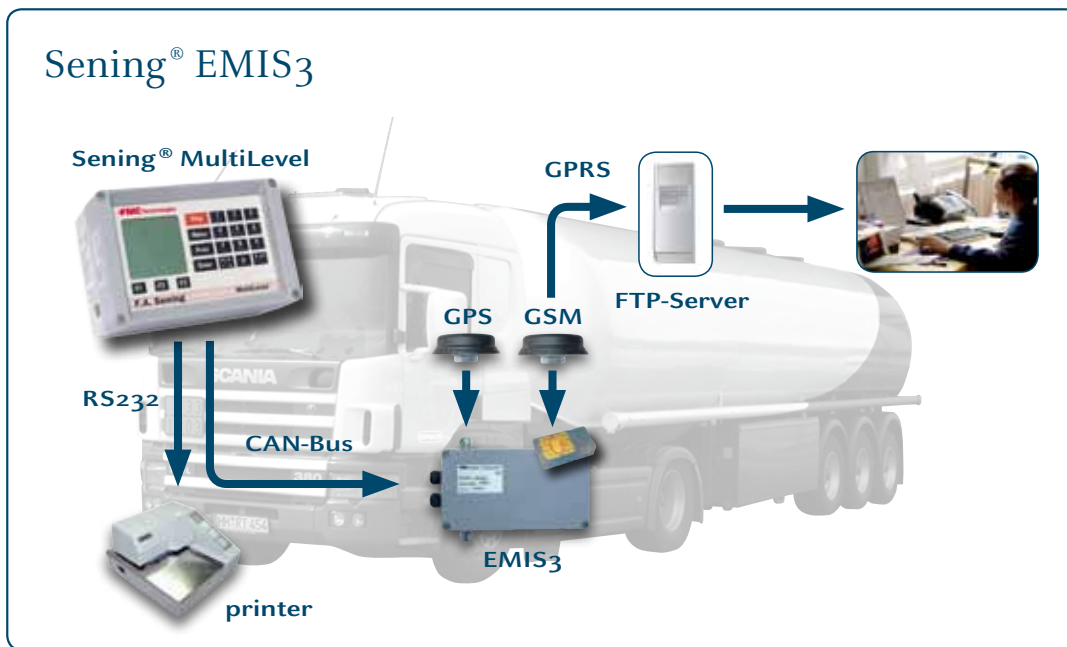
24 VDC (15-30V) < 30 W

Sening® Data Communication Modules

Sening® EMIS2



Sening® EMIS3



**We put you first.
And keep you ahead.**

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