GE
Asset Intelligence

The VeriWise™ DG100 product is an externally powered mobile telematics unit which combines the latest duplex data service, GPRS/GSM based communications, GPS and RF technologies to deliver a cost-effective and reliable asset tracking and fleet management solution. Unique features include wireless sensors, over-the-air software maintenance and configuration, standard factory fit of modem in the trailer manufacturing production line for new assets, CANbus integration for EBS brake diagnostics, long-life battery, wide operational temperature ranges, fail-safe features to help deter thieves and reefer engine protocol integration for refrigerated reefer transport.

The DG100 sends information in real time at preset intervals via GPRS/GSM. The data is then available to you via the internet.

VeriWise Features

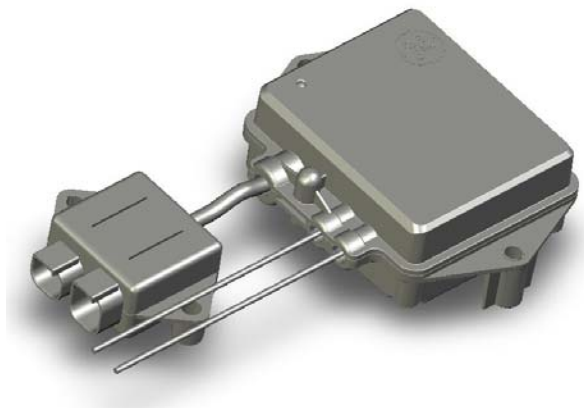
- Best-in-class technology
- 24-hour secure access to user interface ... with visual asset mapping
- Exception management of data
- Reporting tailor-made to fit your operations
- Collaboration with respected industry experts and global channel partners
- Installation, repair and maintenance support ... comprehensive European workshop and mobile van network
- A transport-focused Helpdesk ... open 24/7 and in multiple languages
- GE brand and reputation ... global R&D capabilities
- Extensive telematics and transport industry experience
- GE FleetAdvice™ consultancy experts using Lean Six Sigma methodology and tools
- Financing options ... with a single monthly service fee
- Available on short term rented equipment from GE's TIP Trailer Services

Technical Specifications

Communication	Quad band GPRS/GSM based
External housing unit	IP66K and IP67 rated 15 cm x 11 cm x 5 cm Not field openable
Weight	~ 710 g
Operating temperature	Refer page 3
Power connection	ABS/EBS, lights and/or reefer
External supply voltage	Voltage range: 9-32 Volt
External supply current	Limited to 400mA@24V (avg)
Battery life	Industrially developed & tested for 5 yr long life 3 month autonomy
Battery power supply	Rechargeable Lithium battery Operational between -50°C to +60°C, charge to -20 °C Low self discharge
Main unit interfaces	CANbus Low power wireless network
Programming	Over-the-air software upgradeable and configurable
Sensors	Wireless (no connecting cables) Housing: 90 mm x 50 mm x 15 mm Door sensor Temperature sensors Reinforced curtain sensor Curtain seal interface Door lock & custom seal i/face Truck ID sensor * Reefer integration * Datalogger integration *

** In development*

Product Datasheet: DG100



Certifications / Standards

Environmentally tested to transportation standards for: temperature, humidity, salt spray, splash/immersion, pressure wash, vibration and shock.

GE imagination at work

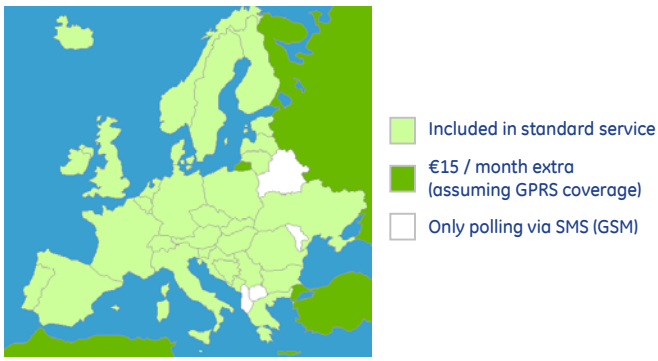
GE VeriWise™
Intelligence for your assets

Product Datasheet:
DG100

Functional Description

Communications
- Utilises General Packet Radio Service / Global System for Mobile Communications (GPRS/GSM)
- Quad band GSM modem & internal antenna
- Duplex communication channel

Figure 1: European communications coverage



Flexible installation options
- *For new trailers:* standard fitting of modem in the trailer manufacturing production line
- *For existing trailers:* installation or retrofit in our extensive European workshop network.
- Covert positioning ... installed in concealed area
- Inexpensive and quick installation using screw mounting

GPS function
- Low-power 12-channel GPS receiver

Modem main unit housing
- Enclosed tamper switch to detect unauthorised opening.
- If unit tampered with or over-the-air command to modem received, emergency tracking can/will be initiated
- Connector for wireless extender (only for metal reefer trailers)

Internal motion sensor
- Motion / stationary logic
- Begin and end of trip reporting

3-axis G-sensor/accelerometer
- Detect trailer movement and real-time shock detection on asset

Message encryption and authentication
- Message encryption ... modem sends message via GPRS/GSM or SMS encrypted with AES128
- Guaranteed message delivery mechanism
- All messages CRC checked

Brake controller - CANbus integration
CANbus integration for EBS brake diagnostics (examples include):
- Load
- Brake pressure
- Mileage
- EBS brake connection
- Roll Stability Program (RSP) activation
- Brake pad wear indicator sensors (optional)

Reporting content (main information)
- GPS location coordinate
- GPS time
- Speed
- Direction
- GPS quality indicator
- Distance
- CANbus
- Power input voltage
- Power state
- Wireless network state
- Wireless sensors (see "General sensor features"below)

Operating modes
- *Active/external mode:* if external power applied modem sends scheduled messages at pre-set intervals of either every 5 or 15 minutes ... depending on customer requirements. During active/external mode, the internal battery will be charged and the modem will operate continuously on the external power source.
- *Battery mode:* is activated after removal of all external power and the modem operates autonomously on the internal battery pack. During battery mode the modem will operate with its wireless network active. To preserve maximum battery power, a default regressive 6 hr battery mode reporting schedule is activated.
- *Battery motion:* if the internal motion sensor senses motion, it will change the reporting frequency in battery mode.

** In development*

For more information on our VeriWise solutions, visit
www.geassetintelligenceeu.com

Functional Description (continued)

Temperature specifications

Operating temperature

Active/external mode: -40°C to +85°C
Battery mode: -20°C to +50°C (Charging)
Battery mode: -40°C to +60°C (Discharging)

Non-Operating temperature

-40°C to +85°C

Events

The modem has functionality to send "events", which are additional messages independent of the selected active mode reporting schedule. Different events are possible and specified by the customer: examples include any change detected by a sensor (e.g. door opening, power change, change in temperature, hooked/tethered, change in load, begin of trip, loaded, reinforced curtain tampering etc)

- *Active/external mode event:* an event in active mode will be sent as soon as possible.
- *Battery mode event:* an event during battery mode will be sent as soon as possible. The detected event will turn the modem temporarily to active mode to enable sending of the event.
- *Battery motion event:* same as battery mode event.

Event store and forward

Event store and forward means that event messages can be created without direct sending of the message from the modem. This occurs in out of GSM coverage situations, where the complete event message will be stored (with original date and time stamp) in modem memory and sent at the moment that normal operation of the modem can be resumed.

Modem logging functions

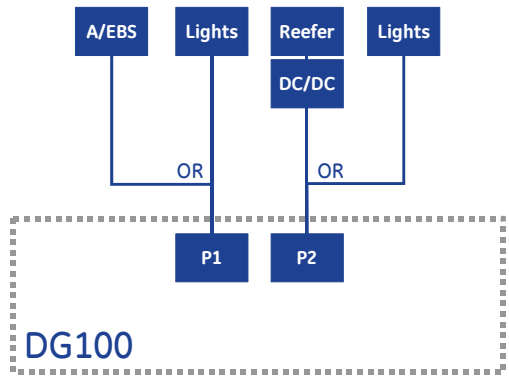
- Distance
- Distance timer
- Store & forward (buffer 1500+ messages)

Power connection and voltage

- The external power source on a trailer is primarily the connection to the ABS/EBS controllers. Lights can be connected alternatively or in addition to the ABS/EBS power source.
- Current limiting and voltage cutoff power inputs
- Dual microcontroller heartbeat monitoring

** In development*

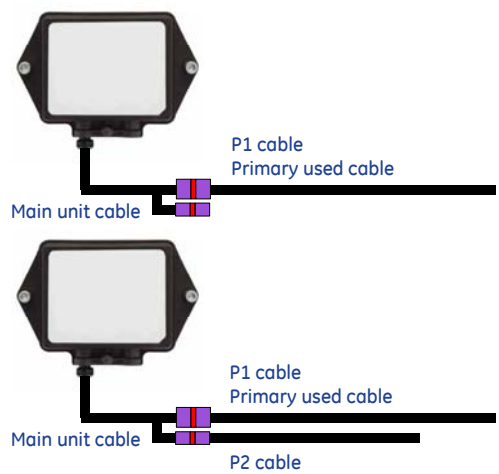
Figure 2: Power connections DG100



All different connections realised via adapter cables

- Pre-defined adapter cables are used to connect DG100 with different devices (trailer EBS, reefer and/or lights). The adapter cable consists of the specific connector (if any) of the relevant device.

Figure 3: Power cables DG100



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Functional Description (continued)

General sensor features
- All sensors wireless (no cables connecting sensors to modem)
- Sensors include:
  - 1 x door sensor, with magnet
  - Multiple temperature sensors, NTC sensor element, temperature range -40°C to +85°C, resolution of 0.1°C
  - Reinforced curtain sensor
  - Curtain seal interface
  - Door lock and custom seal interface, serial+ connection
  - Truck ID wireless sensor *
  - Reefer integration*:
    - Thermo King SL200 (ibox)
    - Thermo King SL400 (ibox)
    - TK Spectrum (ibox)
    - Carrier Vector
    - Carrier Maxima
  - Datalogger integration* (Carrier DC500). Used to access remote information about reefer engine, including Set Point, operating mode, defrost, engine running hours, alarm codes (shutdown), battery voltage, oil pressure, and coolant temperature.
- Sensors can be battery operated or external powered. Target battery life of sensor is 5 years, non replaceable. External powered sensors connect to either 12 or 24V, and have a backup battery.
- Low power 2.4 GHz wireless sensor network
- Sensor contains LED for installation purposes
- 2-way encrypted communication for permanent associated sensors

Sensor housing
- Glass fibre reinforced polyamide
- Not field openable

Figure 4: Sensor housing

Miscellaneous
- Unique ID number
- Over-the-air software maintenance and upgradeability (made remotely by GE VeriWise experts)
- Configuration and parameter changes
- Firmware & sensor firmware/logic commands and updates

** In development*

About Asset Intelligence

GE's Asset Intelligence business leverages 10 years of experience working with customers to develop and deliver the best proven vehicle telematics service, with over 150,000 VeriWise modems activated globally. Through innovative wireless communications and web technologies, our VeriWise satellite and GPRS/GSM based solutions allow you to maintain control of your assets and freight, and make timely, well-informed decisions that can boost profits, improve business performance and set a new standard in your customer service.

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