Railway Energy Meter – REM102 – EN50463:2017

The REM102 device performs the reading of analogic voltage and current information coming from up to four local transducers with analogic output, connected directly to the line, and real-time calculation of energy during a programmable period of time according to EN50463:2017 (EMF and DHS functions).

REM102 supports 25 kV - 50 Hz, 15 kV - 16.7 Hz and DC (3 kV, 1.5 kV, 750 V, 600 V) lines and is able to compute energy consumption and regeneration with an accuracy metering of class 0.5 R (ECF).

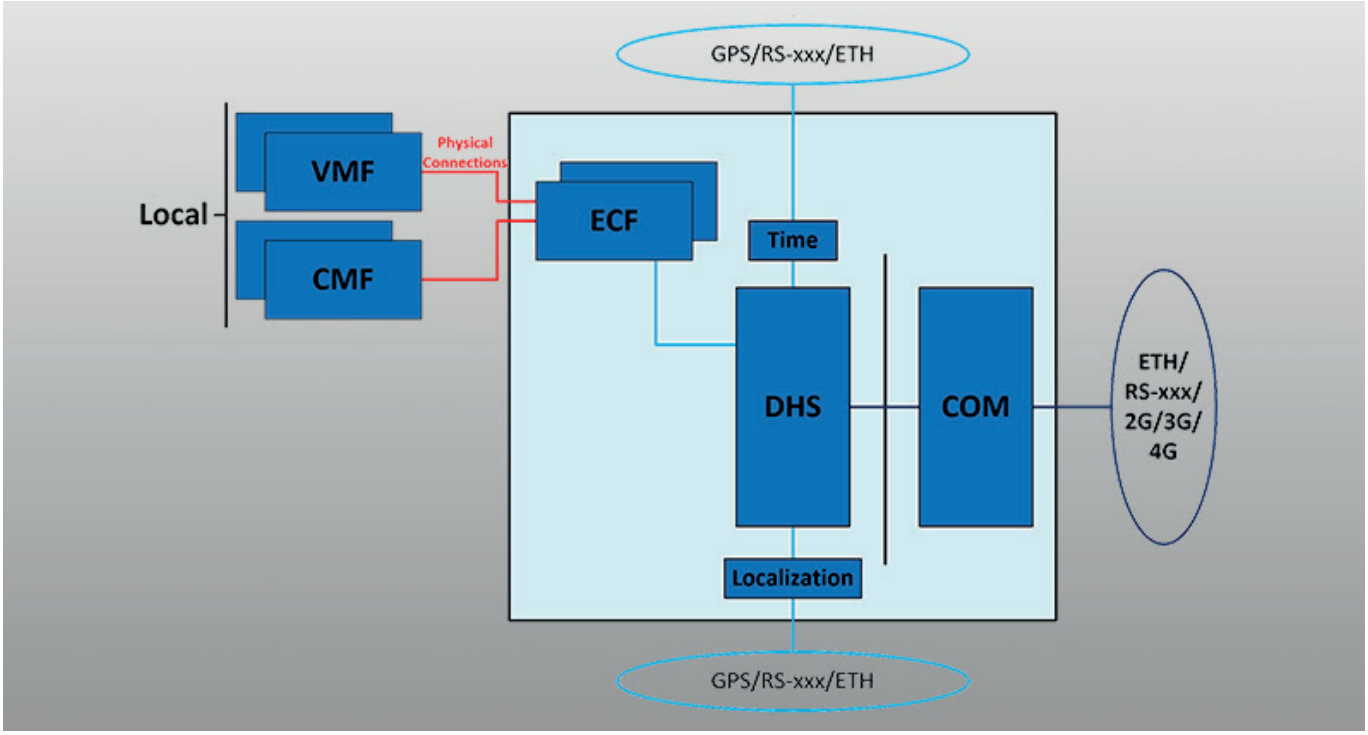
REM102 is able to adapt to different transducer output formats as the four isolated inputs available can be configured independently according to the application (DC, AC, voltage or current). The connectors for the Transducers cables are coded, in order to avoid wrong insertion between voltage and current inputs.

REM102 is also able to manage a network of HaslerRail RTP100 protection device via RS485 communication link.

The timing and localization information required for the implementation of the DHS function, can be brought to the REM102 either from a GPS system (a GPS receiver can be equipped directly on the device) or from a serial link.

For the transfer of stored data REM102 can use either 2G/3G/4G networks or Ethernet LAN for direct data transmission to the ground server.

The following figure illustrates the metering functional architecture of the device.

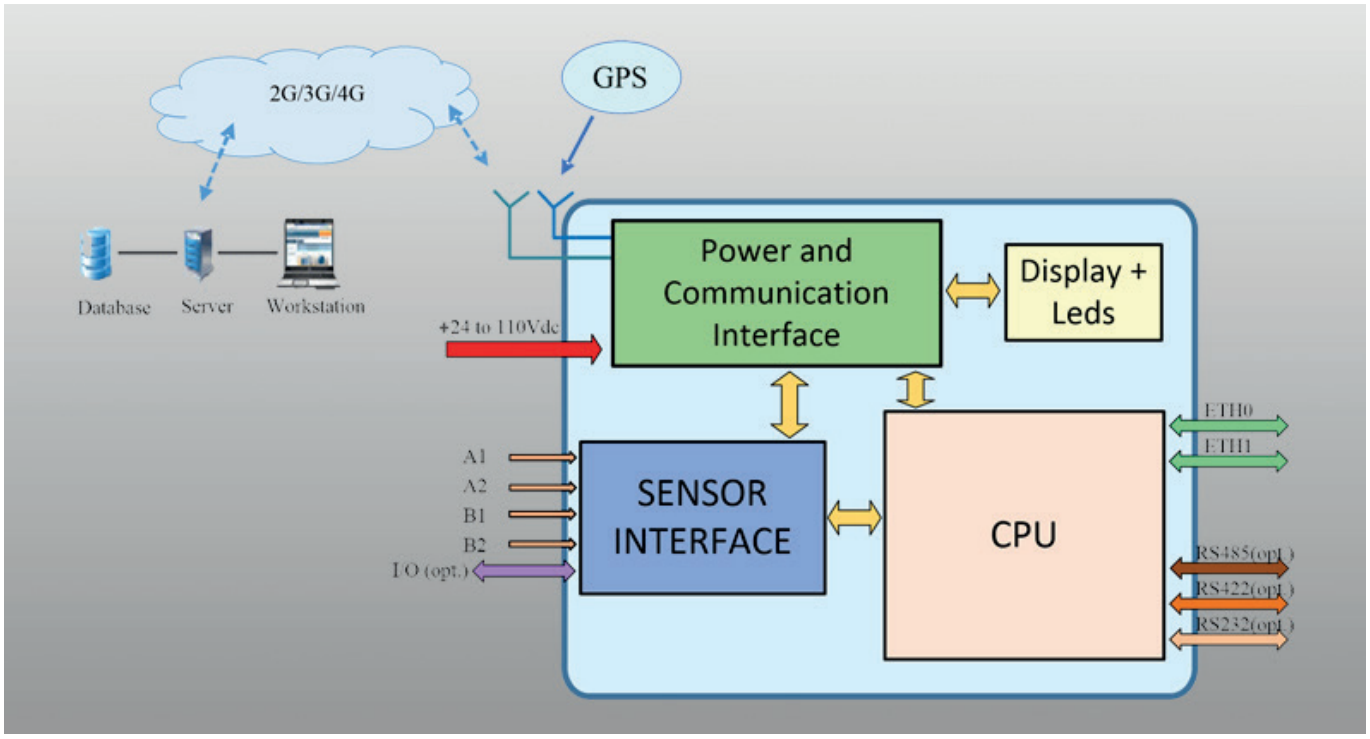


An internal RTC circuit keeps the time reference aligned by means of a battery. This battery is externally accessible to simplify replacement. Energy data are stored inside the on-board memory and the load profile recordings are selectable between 1, 5, 10 and 15 minutes, as indicated in EN 50463:2017 (Reference Period).

The storage of load profile is at least 60 days so that the system is suitable for fiscal use. The integrated display allows an easy interaction of the operator with the device. According to EN50463:2017 requirements, the REM102 supplies energy data (energy delta value, energy index value) and flags associated to DHS functions (quality, location data, time data flags...)

For DHS functions, REM102 is able to supply information and provide support for auto diagnostic alarms and service messages. An auxiliary I/O interface provides 2 opto-isolated Digital Inputs and 4 Relay Digital Output for general purposes or diagnostic.

Different Ethernet protocols based on TCP and UDP can be implemented for the diagnostic and monitoring communication with the train control system. If redundancy of communication, the availability of two Ethernet interfaces allows the implementation of “dual homing” communication schemes. A wide range supply module allows REM102 to be powered with battery voltage from 24Vdc to 110Vdc. A passive power supply filter can be mounted in order to allow RIA12 compliance of the system in 110Vdc models.



Properties

Main Processing Unit	Freescale PowerPC™ CPU Core @400 MHz
Main Memory	System Memory: 256 MB DDR2 Flash Memory: 2 GB
Communication interfaces *	**The addition interfaces available are** Up to 2 Ethernet 10/100BASE-T interfaces 1 insulated serial interface RS485, RS422 or RS232 1 3G or 4G antenna interface 1 GPS antenna interface
AC/DC Inputs	Up 4 inputs individually configurable Type of input: AC/DC voltage or current. Maximum input range: ±1,5 Nom Input
Auxiliary Digital I/O	**2 Digital Input** Thresholds: ON ≥ 14.4 Vdc; OFF≤ 3 Vdc or open Maximum operating voltage: 154 Vdc Protected against reverse polarity. **4 Digital Outputs free contact type** Contact type: free N.O. contact Rated current 2 A Maximum operating voltage: 154 Vdc
Radio Interface	GSM-R: Class 4 (2W radio) 3G/4G band: DCS, UMTS, LTE Sensitivity: Better than -102 dBm Connector: SMA/Type-N
GPS input	Frequency input: 1574,42-1576,42 MHz Sensitivity: –162 dBm –148 dBm (cold start) Accuracy (steady state position): 2,5 m A-GPS functionality for quick initial position acquiring Connector: SMA/Type-N
Energy Measurement	Accuracy class (ECF): 0,5 R
Power Supply	Continuous applicable operating voltage from 16.8 Vdc to 137.5 Vdc Supply Filter for RIA12 Standard compliance on 110 Vdc models Power Consumption: 20 W max.
Operating Temperature	EN50155 class OT4 (-40 °C to +70 °C)
Physical Characteristics	Housing: anodized aluminium, IP54 protection Dimensions (mm): 165 (L) X 231.5 (W) x 85.7 (H) Weight: 2.5 kg
MTBF	85.000 hours according to Siemens 29500 @25 °C GM for the minimum assembly version 65.000 hours according to Siemens 29500 @25 °C GM for the complete assembly version 500.000 hours (estimation from field data)
Other compliances	Altitude: Class A1 EN50125 Shock and Vibration: EN60373 Cat. 1, class B Smoke and Fire: NFF 16-101/102, EN45545 level HL2

On board Maintenance interfaces	OLED display panel for visual status information HTTP-based interface (web manager) Different access levels, password protected Detailed information about status of REM and network interfaces Application Software and firmware update
RTP100 Management	Communication via: RS485 Number max of devices: 4
Software and Libraries	Linux 2.6 Operating System REM application

* Not all configuration are available at the same time.

Standards

EN 50155	Railway Application Electronic Equipment used on Rolling Stock – 2017
EN 50463	Railway applications – Energy measurement on board trains – 2017
EN 50121-1	Railway applications - Electromagnetic compatibility, Part 1: General
EN 50121-3-2	Railway applications - Electromagnetic compatibility, Part 3-2: Rolling stock – Apparatus
GM/RT2132 Iss.2	On-board Energy Metering for Billing Purposes

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