

#### manage energy better

# Technical data Pilot Frequency Generator GPS



#### Summary of the most important advantages:

- Precise synchronization unit for ripple control systems
- Highly precise frequency, phase angle and time of day available worldwide
- Programmable oscillator for all ripple control frequencies
- No need for expensive transmission of the pilot frequency signal to the substation
- Front panel operating with integrated LCD display
- Serial interface to output the time information
- Easy to integrate into existing systems

### **Basic principles**

The Global Positioning System GPS was developed for navigation purposes. GPS operation is based on the measurement of ranges between the user and a number of satellites in the GPS constellation. The GPS unit determines its position by receiving the exact positions from the satellites. GPS spacecrafts continuously transmit data providing the user with information on satellite position and correction data for the precise clock in the satellite.

From this precise clock information, a pulse with high accuracy for the synchronisation of a frequency generator can be derived.

#### Main Pentures

The pilot frequency generator GPS consists of a high accuracy satellite receiver and an I/O board, developed for Ripple Control specific requirements. It generates accurate clock information for time synchronisation and a stable low frequency signal with accurate phase. This low frequency signal in the range of 150 to 2000Hz is used to produce the pilot frequency for synchronisation of ripple control transmitters in the substations. Therefore ripple control independent network operation is possible. With this approach the synchronisation information must not be transmitted from the central station to the substation anymore. This results in lower cost for traditional telecontrol equipment and allows the use of serial communication systems such as PCS. In addition, a high precision time signal is available in every substation of the utility.

### Mechanical construction

The GPS hardware is built into a single 6U module. All inputs and outputs incl. line voltage are accessible from the front. Hence the module can easily be integrated into the process controller of the local controller MLC or other existing 19" racks.

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#### **Functional diagram**



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Frequency output	<ul> <li>150 2000 Hz</li> <li>Square wave signal ±0.86 V or ±1.5 V at 40 600 Ω</li> </ul>
Frequency accuracy	<ul> <li>10-<sup>9</sup> after synchronisation and</li> <li>20 minutes operation</li> </ul>
Phase angle	<ul> <li>±360 degrees adjustable in steps of 0.1 degrees</li> </ul>
Phase accuracy	■ ±0.5 ms (±0.36 degrees at 2000 Hz)
Mounting of antenna	Cone with free view to the orbit and with an inner angle ≥120 degrees
Serial interface	RS-232, 300 19200 baud
Power supply	■ 230 VAC ±15% / 240 VAC + 10%, -15%
Dimensions	Module 6 U, 21 TE
	Module with 3 U also available
EMC	IEC 801, class 4
Operating temperature	■ 0 60°C

GPS built into 19" rack of local controller MLC



## Landis+Gyr AG

Undermülistrasse 28 8320 Fehraltorf Switzerland

Phone +41 44 954 8111 Fax +41 44 954 8101 info-bulm@landisgyr.ch www.landisgyr.com/europe