Kephren data logger

Kephren is the multi-purpose data logger of the Osiris Family. It provides the complete range of services of the Osiris Platform with the advantage of a low power consumption. The wide range of capabilities and the extremely flexible parameterization makes Kephren a choice data logger for most application:

- high resolution seismic survey based on real time data transmission over a connected array
- building/industrial plant monitoring
- stand-alone station for long term recording
- noise measurement in urban sites
- dense mobile array with wireless remote monitoring
- permanent observatory station for earthquake monitoring

Sensor interface, input stage:

Kephren can receive almost any type of seismic sensor. The 128dB@100Hz dynamic fits most of the common needs. For higher dynamic, users should prefer the Kheops station. Mass centering and calibration lines are fully controlled by the user with a 62.5µs time accuracy. Sampling rates and hardware gains are selectable by for each channel.

Communication:

Kephren is a highly communicating device: it is *de facto* wireless ready (Ad-Hoc, Infrastructure and AP mode). Kephren also integrates a 10/100Mb/s ethernet interface, a USB slave network interface, and it is PPP ready (for incoming or outgoing calls).

The Osiris Dynamic Routing system makes network parametrization useless: no need for sysadmin knowledge. The Osiris Dynamic Routing system manages the routes, propagates state of health information and makes each station a router: the seismic array is also a self organized and self healing communication array.

Power consumption, timing:

Kephren implements some advanced power management features, the power consumption is 1.5W for 6 channels in continuous recording with a timing accuracy of 200µs. The user can lock the clock on the GPS to reduce the timing accuracy to less than 5µs with no drift (phase and frequency lock).

Interoperability:

The Kephren station integrates all the necessary services for remote data synchronization (ftp client and SeedLink server) and can easily be integrated in EarthWorm-like systems via SeedLink/SeisComP.

No special software is required to control Kephren. Any TCP/IP capable device running a browser is able to be used as a control device for Kephren. There is no dependency on the operating system or processor type. The DHCP server running on each interface makes very easy the connection to the station.

Agecodagis provides the software tool to convert data to the most used formats (SAC, SEED etc., on various 32/64bits OS, see Titan2Reader).

Delivery:

The Kephren station is shipped with the external storage support, GPS antenna (5m cable), wireless interface (5m cable), a case for shipping and installation, a 4m mast for GPS and wireless interface, cables (power, USB, eth, serial), and open connectors for seismometers.

Some references:

LGIT (Grenoble, France), Géosciences Azur (Nice, France), CEN (Grenoble, France), Géosciences Azur (Nice, France)...

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Technical specifications of the Kephren data logger

Mechanical:

Size	Length, width, height: 270mm, 250mm, 170mm (digitizer) Shipping and installation case: 540mm, 400mm, 240mm
Weight	3.5kg (12kg with case and all the cables and accessories)
Watertightness	IP67 (digitizer)
Connectors	MIL-C 26-482 series
Operating temperature	-20 to 85°C with (0-50°C with mechanical external storage)

Power:

Main power	9-16V
Backup battery	8.4V, >2000mAh for external power hot-swap
Power consumption	1.5W (6ch@250Hz cont. rec, 100µs acc., no wireless)
Protection	Fuse and diodes
Modes	Operating, low power (no digitization/timing, communication on), off +timekeeping, sleep (with programmable wakeup).

Timing:

Modes	GPS (NMEA + 1PPS) or 1PPM, time-keeping
Receiver	GPS 12 channels on serial line (5m, up to 100m), 1PPM source
Accuracy	<1µs instantaneous, 100µs on 5m/hour duty, <5µs no drift GPS locked
Logging	Instantaneous drift and correction logged

Recording and storage

Recording modes	Continuous, event trigger, cross station trigger, window...
Internal storage	On flash: 64MB Seedlink, 64MB Titan2
External storage	USB2 8+GB (flash) 120+GB (2.5"HD)
Policy	Cycle/Stop, hot swappable external storage
File system	Ext2/3, vfat
Data retrieval	Storage swap, FTP client, WEB-based data requests ...
Data format	Titan2 format (24bits lossless compression, health state data multiplexed)

Input stage and A/D conversion:

Converter	24bits Σ/Δ synchronous (16000Hz head frequency)
Input range	+/-4.5V (LSB=536nV at gain=1)
Dynamic	128dB@100Hz, 117dB@1000Hz
Sampling rates	selectable per channel: 1Hz...2kHz
Channels	3 to 24 physical, 24 logical
Hardware gains	1,2,4,8, selectable per physical channel (3% accuracy)
Input impedance	25kΩ
Power consumption per ch.	+10mW
Output lines	Power, mass centering, and calibration, all user controlled
CMR	Better than 120 dB
Cross talk	Better than 120dB
THD	Better than 105dB
Offset drift with temperature	Better than 10µV/degree

State of health:

Internal parameters	Main battery and internal temperature are recorded as aux. channels
External parameters	Up to 6 digital sensors can be record (over TCP)
Safe shutdown	Internal battery powered in case of main power failure
Human interface	Output: 14 HID led panel (no LCD) for complete heath state, Input: factory-reset, tilt detector for GPS and wireless wakeup

Communication:

Integrated interfaces	10/100Mb/s ethernet, 802.11b (Wireless), USB slave, serial (modem/GSM ready)
Setup	Osiris Dynamic Routing and/or DHCP on all interfaces
Control interface	Web page, Osiris Shell, OMNI
Data transfer	Real time SeedLink, automatic FTP synchronization

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