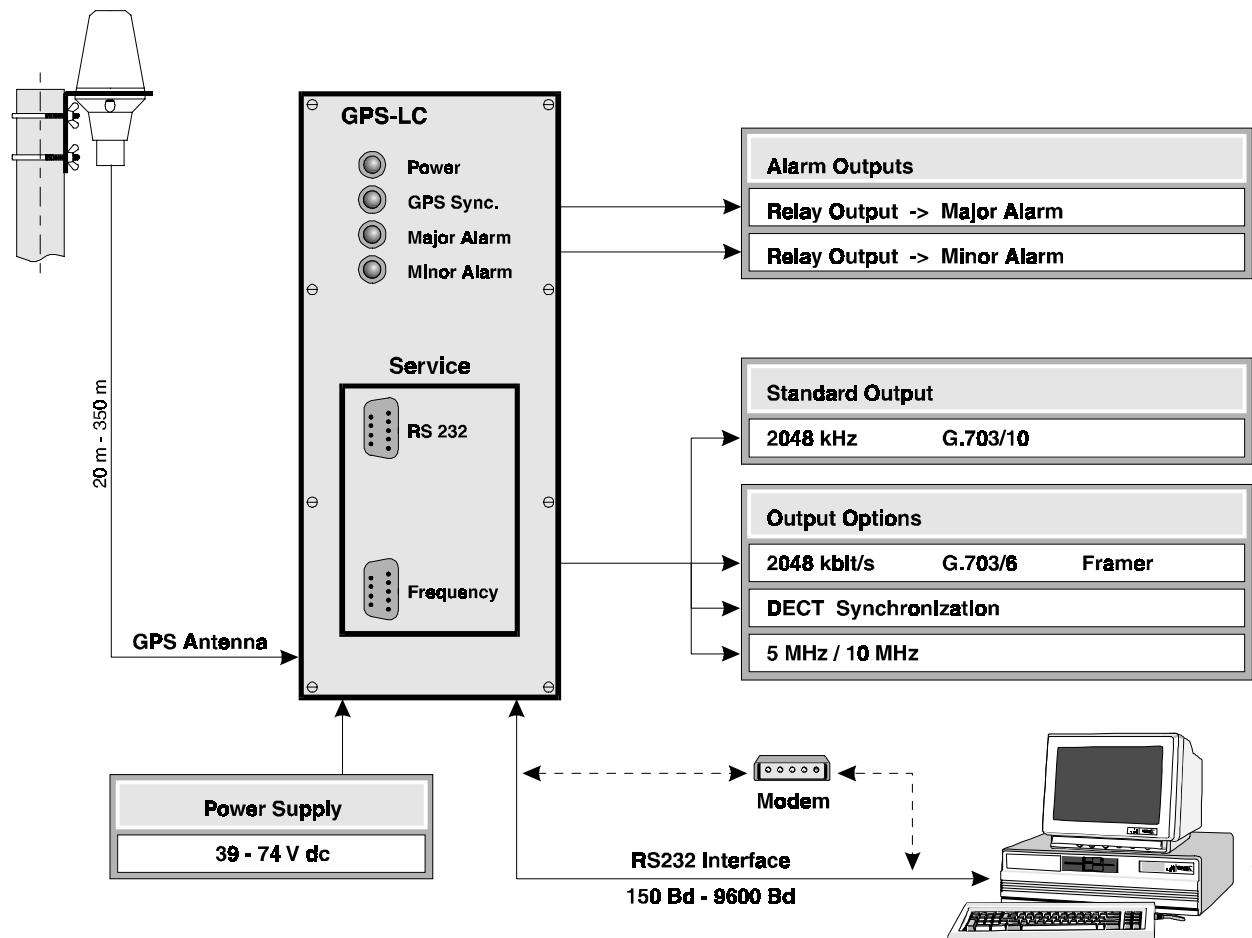


GPS - LC Frequency Standard

Low Cost GPS-Solution for Synchronization
and Frequency Stability



Low cost GPS-Receiver for Synchronization in Digital Networks

- | | |
|---|--------------------------------------|
| ■ Frequency Accuracy: 1×10^{-11} (24h) | ■ Relay Outputs for Alarm Monitoring |
| ■ Timing Accuracy: 200 ns (MTIE 10^4 s) | ■ Squelch Function |
| ■ Status LEDs | ■ RS232 Interface |

GPS-LC Overview

The *GPS-LC* is part of EFRATOM's new low cost GPS solutions for timing synchronization and frequency stability in wireline and wireless applications. The system receives the satellite signals at any place on earth and uses special algorithms to control a crystal oscillator. With the use of the accurate GPS timing signals, the *GPS-LC* generates a high performance frequency and guarantees a frequency accuracy of 1×10^{-11} (24 h average), which complies with G.811.2. In case of failure or loss of the GPS

signal, the crystal oscillator changes into holdover mode (minor alarm) and provides the frequency output for a specified holdover. The holdover conditions are settable and depend on the oscillator type and the application requirements resp. If the oscillator is no longer able to provide the specified accuracy, the system is running into timeout 2 (major alarm). The frequency output will be switched off (squelch function). This facility prevents the output frequency from unserviceable signals.

GPS-LC OPERATION

Frequency

After warm up and locating the current position, the GPS-LC operates with a frequency accuracy of 1×10^{-11} (24 average), even if only one satellite is received. In case of failure or loss of the GPS signal or any other system faults, the frequency output at the rear panel will be disabled (squellch) under consideration of the specified holdover requirements. The frequency output at the front panel (test connector without squellch) is available continuously.

The standard output frequency of the *GPS-LC* is 2048 kHz G.703/10. Further output options are specified in the technical details.

CPU / RS232 Communication

The CPU of the *GPS-LC* collects data of the system components and controls the operation of the device. Two independent RS232 ports allow to communicate with the *GPS-LC* microprocessor. These interfaces can be used for system monitoring and for programming the device. It is possible to connect a PC directly or via modem network for remote controlling. Date, time or position can be transmitted as well as status information and alarm conditions. In auto-mode the *GPS-LC* reports important data via RS232 without any user action.

User defined settings are stored in a permanent memory. These settings are available immediately after switching on the system. The *GPS-LC* firmware runs from a FLASH-EPROM and can be changed easily by uploading a modified version via RS232 for user specific applications.

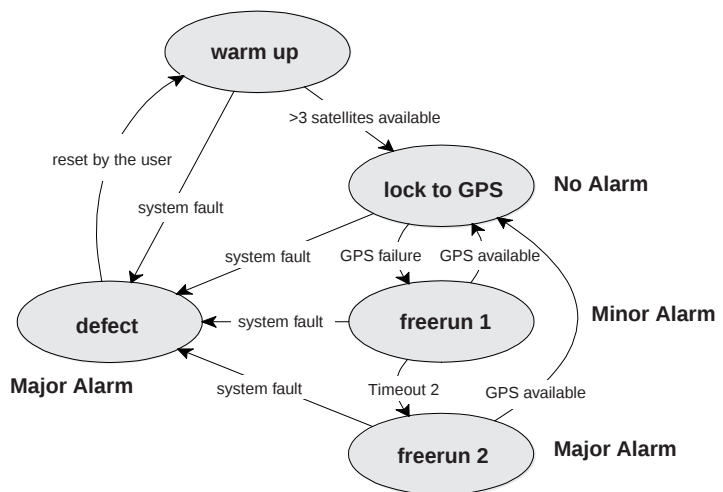
Alarm Monitoring

The *GPS-LC* is controlled by a multi-level alarm system. The system status is indicated by four monitoring LEDs, two alarm relays and via RS232 monitoring.

In case of GPS failure the system goes into holdover and generates the output frequency continuously until timeout 2 expires.

The holdover conditions are settable and depend on the oscillator type and the application requirements resp.

In case of any other system failure (oscillator failure, receiver failure, ...) the frequency output will be disabled.



Alarm Monitoring						
Indicator				Explanation	System Status	Frequency
LED	green	Power	-	Power on - system operable	-	-
	green	GPS-Sync		GPS-LC is locked to GPS	normal operation	available
	yellow	Minor Alarm	Relay A1	GPS failure freerunning time within specification	MINOR ALARM	available
	red	Major Alarm	Relay A2	- System fault - GPS failure freerunning time out of specification	MAJOR ALARM	squellch no frequency

GPS-System

The Global Positioning System (GPS) is one of the most accurate navigation systems consisting of a network of 24 satellites. Each satellite is carrying accurate controlled atomic clocks for transmitting timing signals world wide. Any observer who can receive signals from four of these satellites can determine his accurate position on earth. In addition, the GPS technology enables many other timing and frequency applications.

GPS-LC STANDARD CONFIGURATION			
Relay Outputs		Connector: SubD15	Power Supply
Number:	2 x change-over contacts floating		DC: 36 - 74 V
Current Capability:	1 A		Power
Voltage Capability:	60 V- / 50 V-		15 W typical
Power Capability:	30 W		Storage Temperature
Relay A = Minor Alarm			Unit: -40° C to +85° C
Relay B = Major Alarm			Antenna: -55° C to +85° C
GPS-Receiver			Operation Temperature
Type:	6-channel C/A-Code-Receiver, tracks up to 8 satellites continuously		Unit: 0° C to +45° C
Options:	- Active Antenna (50 dB Pre-Amp) with mounting hardware - antenna cable* 20 m up to 350 m - lightning protector		Antenna: -55° C to +85° C
Internal Time Base			Dimensions
Type:	TCXO		Unit: 75 x 176 x 156 / w x h x d (mm) ETSI / 19", 2 UI on request
Aging per Year:	+/- 1,0 x 10 ⁻⁶		2 x RS232-Interface
Temp. Range Stability:	+/- 3,0 x 10 ⁻⁶ (-30° to 75° C)		Connector: SubD9
Type:	OCXO		1 x front panel, 1 x rear panel 9600 Bd, ASCII Protocol
Aging per Day:	+/- 1,0 x 10 ⁻⁹		
Temp. Range Stability:	+/- 5,0 x 10 ⁻⁸ (-20° to 85° C)		
Accuracy			
	(GPS available)		
Frequency Accuracy:	<1 x 10 ⁻¹¹ (24h)		
Timing Accuracy:	200 ns (MTIE 10 ⁴ s)		

GPS-LC OUTPUT OPTIONS			
LC - E1 / Framer		2048 kbit/s / G.703/6	LC - DECT
Output:		Connector: SubD9	Output:
2048 kbit/s / G.703/6	75 Ω unbalanced / 120 Ω balanced		100 Hz DECT Synchronization Signal per ETS 300 175-2
LC - 5		5 MHz	LC - DECT/12
Output:		Connector: SubD9	Output:
5 MHz	RS422 or sine wave 1 V _{rms} / 50 Ω		RS422
LC - 10		10 MHz	Connector: SubD9
Output:		Connector: SubD9	1 pulse every 12 seconds rising edge in sync with t _{GPS} modulo 12 s pulse width 12 μs
10 MHz	RS422 or sine wave 1 V _{rms} / 50 Ω		

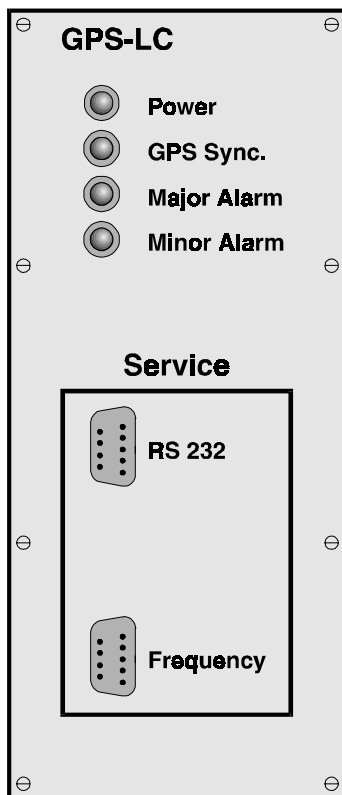
Standard Unit:	- GPS-LC - 1 x freq. front panel (no squelch) - 1 x freq. rear panel (with squelch)
Option:	- GPS antenna - additional 1PPS output - 20 m up to 350 m antenna cable - lightning protector
User Defined:	- User defined outputs and dimensions on request

* Possible Length of Antenna Cable	
20 m - 45 m	RG-58
45 m - 100 m	RG-213
100 m - 200 m	Aircom
200 m - 350 m	LCF 1/2"

(The specified cable length are only valid for the connection from the GPS-LC to the specified GPS antenna)

GPS - LC FREQUENCY STANDARD

Low Cost GPS-Solution for Synchronization
and Frequency Stability

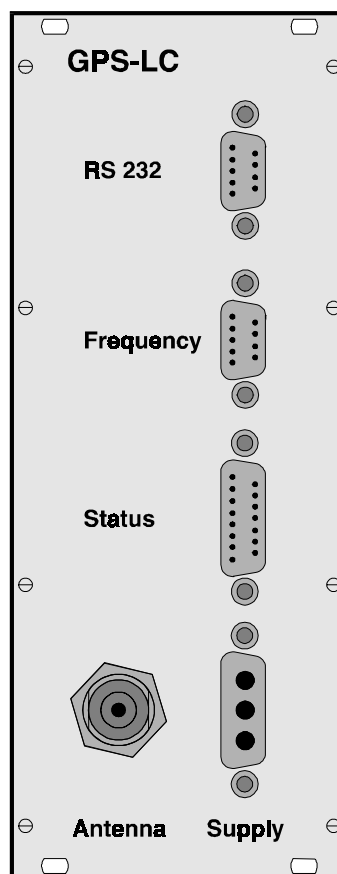


Front Panel

<- LED Section

<- SubD9
RS232 Interface

<- SubD9
Frequency Output
Test Connector
(no squelch)



Rear Panel

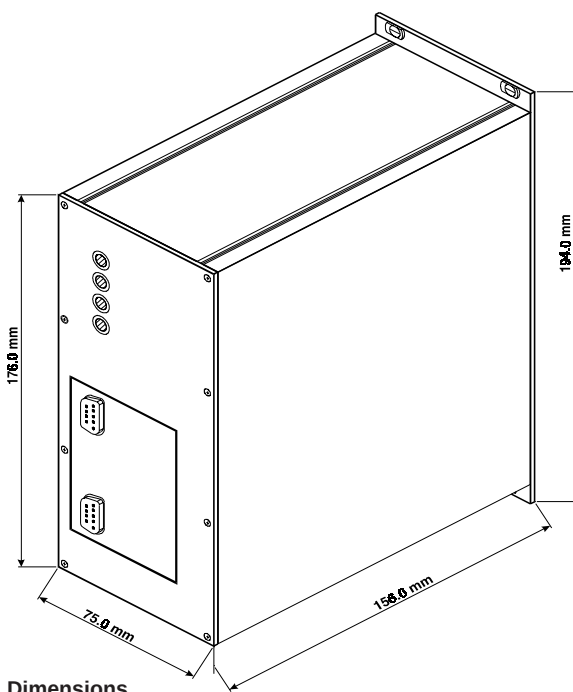
<- SubD9
RS232 Interface

<- SubD9
Frequency Output
(with Squelch)

<- SubD15
Relay Outputs
Alarm Monitoring

<- Cannon 3W3
Power Supply

<- N-Connector
Antenna Input



GPS-LC	Order Number	
Standard:	TCXO	OCXO
LC - 2048	ETN 84100000	ETN 84100010
Option:		
LC - E1 / Framer	ETN 84100100	ETN 84100110
LC - DECT	ETN 84100200	ETN 84100210
LC - DECT/12	ETN 84100300	ETN 84100310
LC - 5	ETN 84100400	ETN 84100410
LC - 10	ETN 84100500	ETN 84100510
Active GPS Antenna	ETN 83209010	
Lightning Protector (N)	ETN 83209001	
Antenna Cable 20 m up to 350 m on request.		