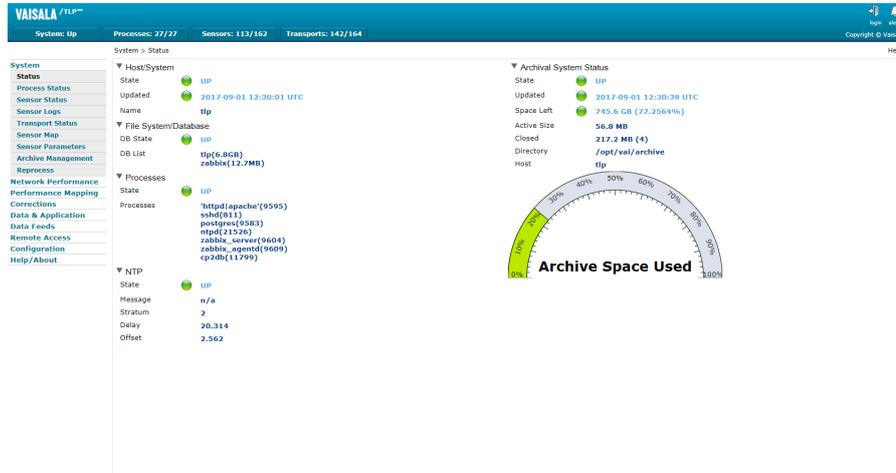# VAISALA

Total Lightning Processor™ TLP100™ and TLP200™ Series

Features

- Continuous monitoring of remote sensor performance and communication status

- Location propagation correction service for improved location accuracy

- Dynamic monitoring of network location accuracy and detection efficiency

- User-friendly, web-based interface

- Zabbix monitoring tools included with customizable notifications

- Geolocating of multiple pulses in lightning generated pulse-bursts

TLP100 Series™ processes data from Vaisala's low frequency (LF) sensors providing lightning location solutions for greater than 90% of Cloud-to-Ground (CG) and 50% of Cloud (IC) lightning flashes. TLP200 Series™ processes data from both Vaisala's LF and very high frequency (VHF) sensors providing lightning location solutions for greater than 90% of both CG and IC lightning flashes.
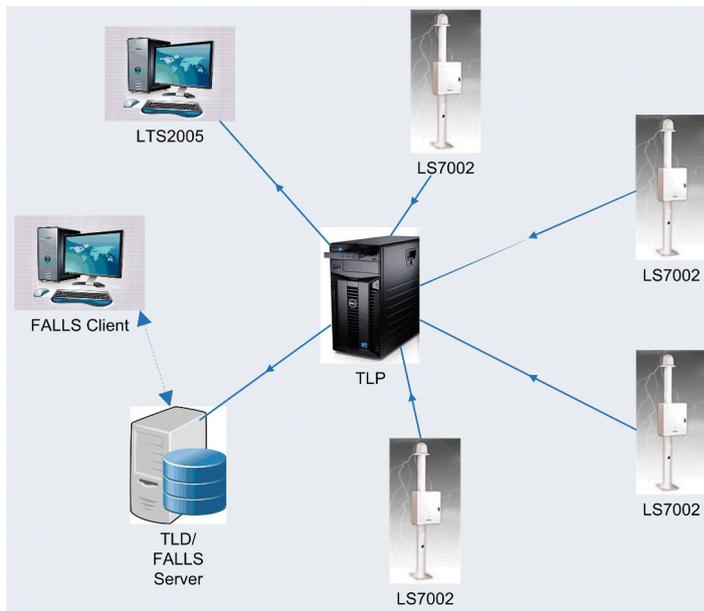
TLP™ uses this data from multiple sensors along with a geolocation algorithm to find the optimum location solution for each lightning event.

In addition, a variety of parameters and associated characteristics are reported for each solution. Lightning data from the TLP™ can be sent to different applications for display, storage, and analysis.

Benefits

- Enhanced lightning classification using multiple waveform parameters

- Improved archive management tools

- Better location accuracy for cloud lightning pulses

Lightning Detection Network

A typical Vaisala LF precision lightning detection network configuration uses TLP100™. Vaisala LF + VHF networks require TLP200™.

Each network consists of four or more sensors (depending upon desired coverage area). Each sensor sends back data from detected lightning-generated electromagnetic signals to the TLP ™ in real-time.

Advanced Lightning Geolocation with Flexible Features

The revolutionary technology in Vaisala Total Lightning Processor™ is designed with multiple performance levels to meet the needs of a wide range of

applications. This allows users the flexibility to choose the features most suited for their application. Licenses are available for the following features:

- System and sensor performance monitoring
- Network performance mapping
- Dynamic detection efficiency (DE) and location accuracy (LA) projections
- Advanced lightning type classification, "burst" processing, and waveform parameters.

These features provide more efficient network operations, stabilized performance, and deliver advanced information about the geolocated lightning events.

TLP™ combines Vaisala's latest patented location algorithm with terrain and propagation correction services, significantly improving the network median location accuracy to 250 meters

or better in the interior of the network. With Vaisala's newest sensor technology, a location accuracy approaching 150 meters can be achieved.

Continuous monitoring

Vaisala Total Lightning Processor™ continuously monitors remote sensor performance and communication status. This allows sensor owners to validate that the sensor is operational and functioning to specifications.

User-friendly, Web-based Operation

TLP™ is available on a Linux operating system for added flexibility and lower ownership costs. TLP™ employs a web-based interface with excellent network monitoring tools.

Vaisala Total Lightning Processor™ TLP100/200 Series™ — License Levels

Part Number	Base + LF	System & Network Performance	Network Performance Mapping	DE/LA Projections	Premium ("Burst" Processing, Enhanced Classification, Advanced Waveform Parameters)
TLP110	✓	✓			
TLP120	✓	✓	✓		
TLP130	✓	✓	✓	✓	
TLP140	✓	✓	✓	✓	✓
Part Number	**Base + LF**	**System & Network Performance**	**Network Performance Mapping**	**DE/LA Projections**	
TLP210	✓	✓			
TLP220	✓	✓	✓		
TLP230	✓	✓	✓	✓	

Technical Data

Operating Environment

Operating temperature[1]	10 ... 35 °C (50 ... 95 °F)
Storage temperature[1]	-40 ... 65 °C (-40 ... 149 °F)
Operating relative humidity[1]	20 % to 80 % non-condensing (non-condensing twmax=29C)
Storage relative humidity[1]	5 % to 95 % non-condensing (twmax=38C)
Operating altitude[1]	-16 ... 3,048 m (-50 ... 10,000 ft)
Storage altitude[1]	-16 ... 10,600 m (-50 ... 35,000 ft)

1) The hardware must be in a climate-controlled environment. The environmental specifications are equal to the HW specifications by default. The following specifications are subject to change without notice based on hardware availability.

Fully Supported Sensors

TLP100™ Series	LS7001, LS7002
TLP200™ Series	TLS200

Compatible but Unsupported Sensors

TLP100™ Series	IMPACT, IMPACT-ES, IMPACT-ESP, LS7000
TLP200™ Series	LS8000

Capacity up to 512 Sensors

Up to 512 for LF only, 256 for LF + VHF data

Supported Communication Interface

TCP/IP

Supported Web Browser Interface

Mozilla Firefox 10 for CentOS 7

Internet Explorer 10 (in compatibility mode) and

Mozilla Firefox 22 for Windows 7

Certified Hardware

Option of Desktop or Rack Mount Server1

Graphical Tools

Sensorqa and networkqa graphs	Time Deviation, 95th percentile Angle Deviation, 95th percentile DE/LA

Certified Hardware Requirements

8 GB of RAM
2.5 Ghz Quad Core Intel Core i7 series or better CPU
2 (1)TB SATA II disk, RAID 1
2 x NIC ports compatible with CentOS 7 (1 Gbps each)
4 USB 2.0 ports
1280x1024 certified video adapter and monitor
DVD+-RW Burner
Graphics card with hardware accelerated drivers compatible with RHEL 6 (512MB RAM, PCI Express Interface). ATI Radeon
HD 4350 GPU (recommended)
CentOS 7, 64-bit edition
CentOS 7 compatible modem

Lightning Parameters

Not all parameters are applicable to all lightning types or license levels

Date and Time to 100 nanosecond resolution
Latitude and Longitude
Number of sensors used in location solution
Position confidence (chi-square)
Degrees of freedom when optimizing the solution
Semi-major axis of the 50% positional confidence ellipse (km)
Semi-minor axis of the 50% positional confidence ellipse (km)
Eccentricity of the positional confidence ellipse
Enable threshold crossing-to-peak risetime (microseconds)
Peak-to-zero time (microseconds)
Maximum rate-of-rise (kA/microsecond)
Polarity
CG flash multiplicity (number of CG strokes per flash)
10-to-90 risetime (premium license only)
50-to-90% risetime (premium license only)
Maximum rate-of-rise of current (premium license only)
Bipolarity (premium license only)
Peak-to-peak times (premium license only)
Associated events before/after (premium license only)
Waveform time before/after (premium license only)

Performance Mapping Tools

Sensor Map	Avg. Positive Signal
Lightning Counts	Avg. Negative Signal
% Positive	Avg. Error Ellipse SMA
% Optimized	Avg. CHI Square Value
% Cloud	Avg. Sensor Count
Lightning Density	

CE

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