GNSS 4500

Satellite Time Signal Receiver

Description

The time signal receiver GNSS 4500 receives and processes the signals of up to three global navigation satellite systems (GNSS). With this precise time sources as a reference, it is designed to synchronize master clocks and time servers. For this purpose, it sends out a serial time signal (DCF coded, UTC or CET) over a current loop interface.

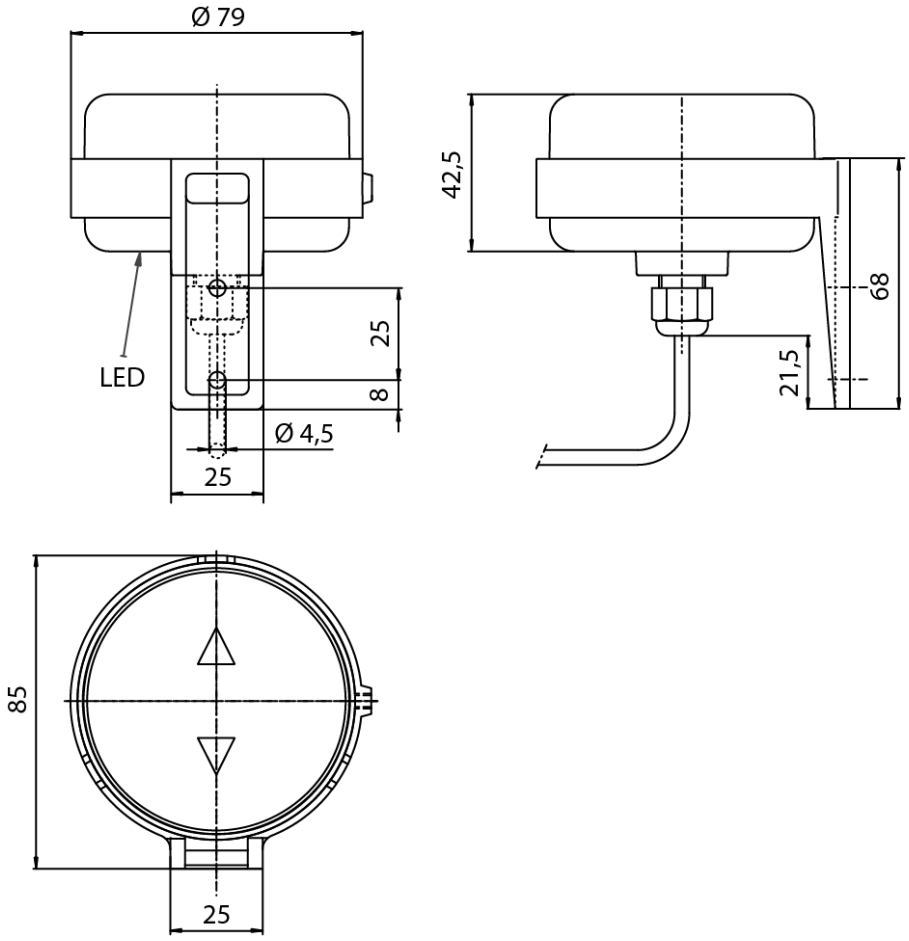
Functions

- Supports the satellite systems GPS, GLONASS, Galileo and BeiDou
- Multi GNSS configurations available for increased stability and Security
- Tracks the signals of up to 72 satellites
- Current loop interface, electrically isolated, for DCF time code output (UTC or CET). Leading edge is synchronous to the 1PPS (second impulse) from the GNSS module
- Automatic stop of the signal output during insufficient reception
- Selection of time code signal UTC or CET via polarity reversal of the supply connectors
- Status display via LEDs (visible from cable side)
- Input voltage 12 - 36 VDC +/-10%, < 0.4W
- Simple mounting: direct connection to end devices via UV resistant 4-wire cable for power supply and time code signal.
- Housing: IP 65, UV resistant, L 85 x W 80 x H 86 mm

Ordering Information

	Cable Length		Used Navigation Systems			
Product Name	**10m**	**100m**	**GPS**	**Galileo**	**GLONASS**	**BeiDou**
GNSS 4500 GPS	129768	129772	•			
GNSS 4500 GPS_Galileo	129769	129773	•	•		
GNSS 4500 GPS_Glonass	129770	129774	•		•	
GNSS 4500 GPS_Beidou	129771	129775	•			•
GNSS 4500 Galileo	130126	130128		•		

Housing / Dimensions



Technical data

GNSS 4500

Reception properties

System	Frequency	Sensitivity
GPS	L1 C/A	-166 dBm
GLONASS	L10F	-166 dBm
BeiDou	B1I	-160 dBm
Galileo	E1B/C	-159 dBm

GPS module

channels: max. 72 satellites traceable

Accuracy time pulse signal:
RMS 30 ns
99% 60 ns

Interfaces / connections

1 x Current loop

DCF: Current loop passive interface (Open Collector)
leading edge synchronous to 1PPS of the GPS module
electrically isolated (optocoupler)

Connection allocation

white	DCF+	optocoupler output (isolated)		
brown	DCF-	optocoupler output (isolated)		
	Time code output UTC		**Time code output CET**	
yellow	V+	(12 – 36 VDC)	V-	(GND)
green	V-	(GND)	V+	(12 – 36 VDC)

Output DCF

Time code UTC or CET
Impulse duration (typical): logic 0: 100 ms: logic 1: 200 ms

CET: automatic daylight saving time change according to valid rule.
announcing bit A1 (Bit 16) supported
CET: last Sunday in October 03:00 -> 02:00
CEST: last Sunday in March 02:00 -> 03:00

Announcing bit A2 (bit 19) not supported for switch seconds

Accuracy Current loop: Leading edge DCF (typical): +/- 5 µs (measured at output GNSS 4500)

Length of synchronization Cold start: < 5 minutes (typical)

Status display LEDs

LEDs visible from below (cable side)

LED red: UTC time output
LED green: CET local time output

Power supply OK: LED blinks once every five seconds [1]
Synchronization OK: LED blinks once per second (signal output)
Synchronization lost: LED blinks once every five seconds [1]

Electrical properties

Input voltage: 12 - 36 VDC +/-10%
Power consumption: < 0.4W (< 34mA @ 12V)

Mechanical properties

Housing material: POM (polyester, UV resistant); black upper, milky white lower
Measurements: 85 x 80 x 86 mm (L x B x H) (L = distance to wall)
Weight: approx. 200g
Cable: 10m, UV protected, 4-wire, 0.25mm^2 (AWG 23), ext. up to 200m possible
Up to 400m with cross section of at least 0.5mm^2 (AWG 20)

Environmental requirements

Protection class: IP 65
Temperature range: -30 °C to +70 °C

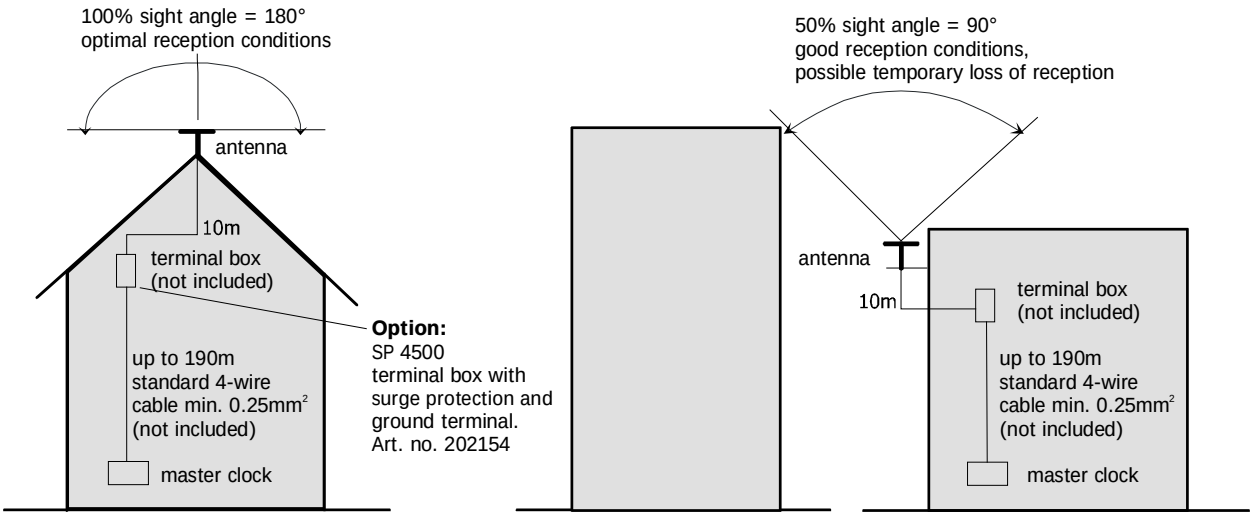
Compliance: 2014 / 53 / EU (see www.mobatime.com)

Accessories

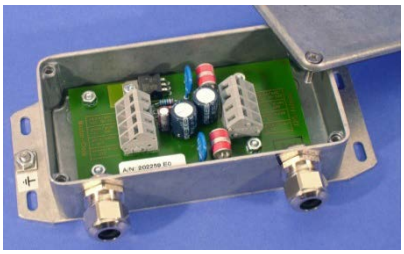
Lightning protection	Art. no. 115948	SP 4500 lightning protection unit for GNSS 4500 receiver
extension cable	Art. no. 104848 up to 100m	UV resistant, black, 4x0.25mm^2, for outdoors
extension cable	Art. no. 104846 100m roll	UV resistant, black, 4x0.25mm^2, for outdoors

[1] The unsynchronized state is signalized on the DCF output (current loop) by 500ms pulses every 5 seconds.

Mounting



SP 4500 – Optional lightning protection box



The lightning protection box SP 4500 protects the master clock from dangerous voltage fluctuations (surges).

To protect the antenna from lightning strike, it must be protected by a lightning protective system on the building.

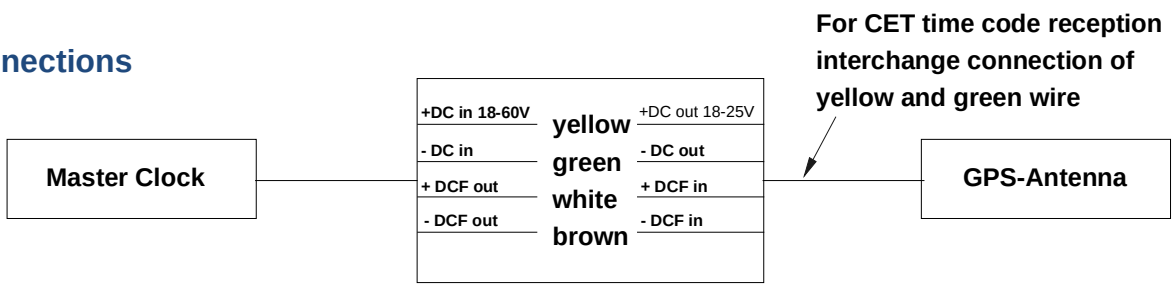
The earth screw on the SP 4500 case should be connected to the building's earth system (ground), the same earth (potential) where you connect metallic parts on the roof. The SP 4500 should be mounted just after the entrance of the cable into the building.

Cross section of the earth cable:

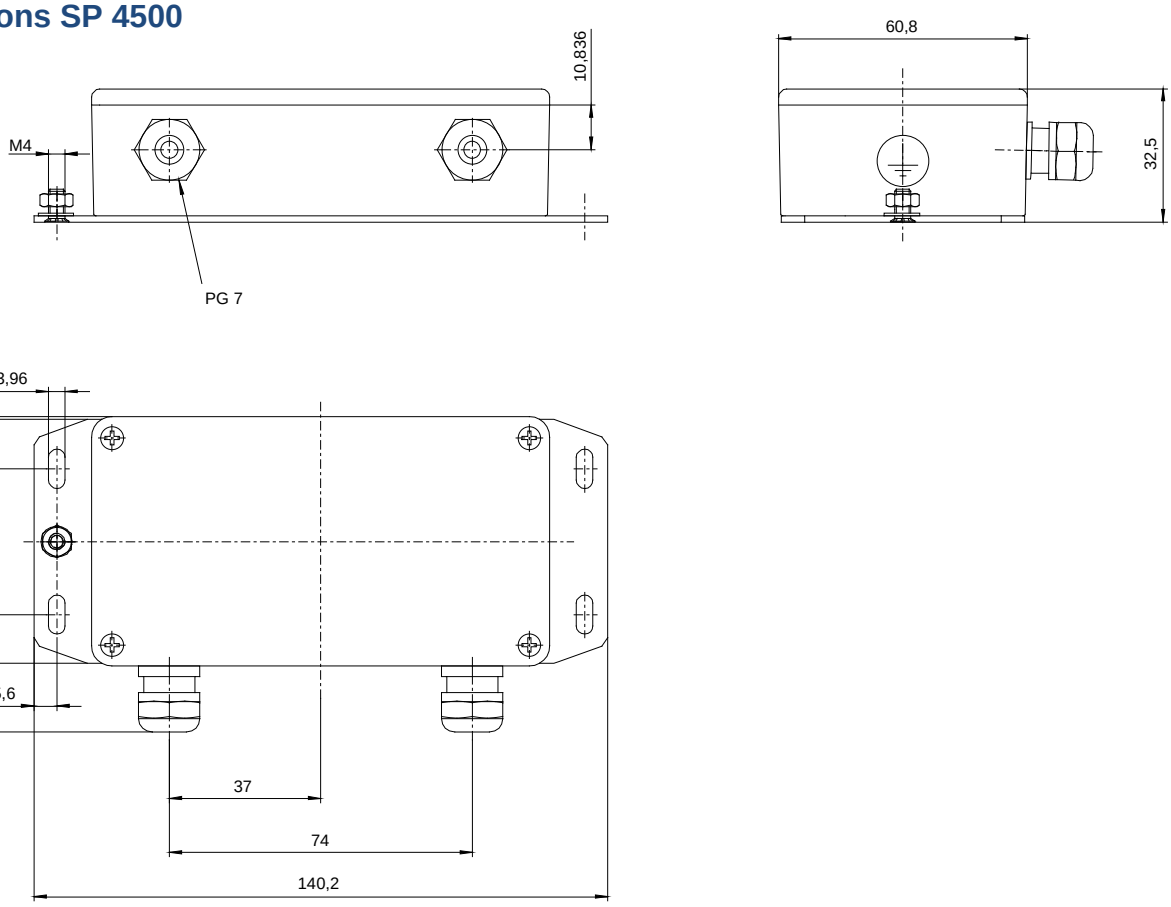
Up to 3m distance and with flex cable, 2.5 mm2 is OK. For longer distance, 4 mm2 or even 6 mm2 flex earth cable should be used.

		SP 4500	
Connections	Allocation	Side master clock	Side GPS receiver
		+DC in 18-60V yellow	+ DC out 18 - 25V
		- DC in green	- DC out
		+DCF out white	+ DCF in
		- DCF out brown	- DCF in
Electrical properties	Input voltage U_{in}	+12 – 56 VDC +/-10%	
	Output voltage U_{out}	U_{in} – 2V up to max. 27VDC	
Mechanical properties	Material	aluminum die cast	
	Measurements	140 x 77 x 33 mm (L x B x H) (L = distance from wall)	
	Weight	180 g	
Environmental conditions	protection class	IP 65	
	temperature range	-30 °C to +70 °C	
Order information		Art. no. 202154	

Connections



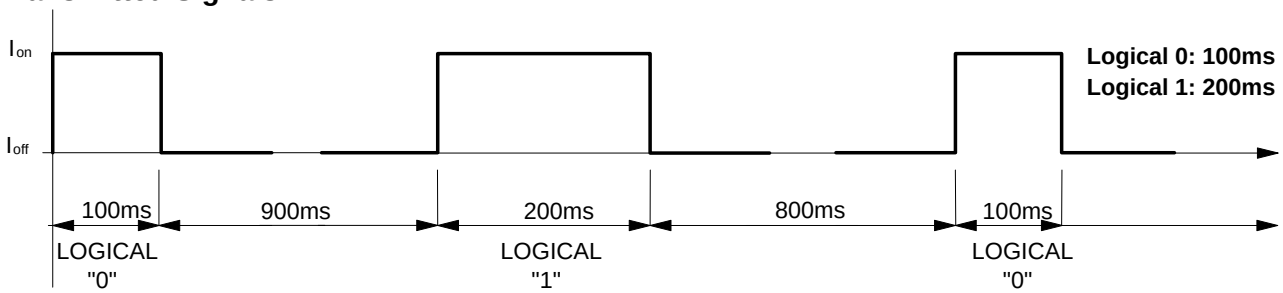
Dimensions SP 4500



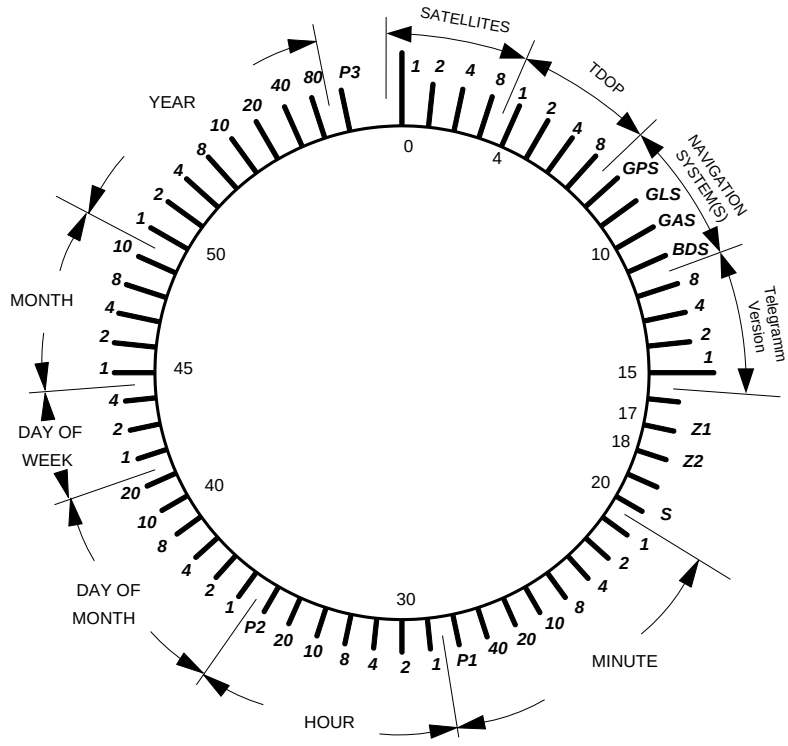
Serial Time Code Output

Depending on the supply voltage's polarity, the receiver outputs either UTC (Coordinated Universal Time) or CET (Central European Time) in the form of a serial time signal. The data transmitted is DCF coded and contains additional information regarding the GNSS 4500's operation, such as the number of visible satellites.

Transmitted Signals



Encoded Information in the time telegram



SATELLITES:
Number of tracked Satellites

TDOP:
Time Dilution of Precision
= 0 TDOP value not available
< 3 very good
< 6 good
> 10 bad

NAVIGATION SYSTEM:
Configured satellite navigation system, multiple sets are allowed
GPS: GPS
GLS: GLONASS
GAS: GALILEO
BDS: BEIDOU

Z1 & Z2:
Season Information
0 1 : Winter (UTC Winter only)
1 0 : Summer

S: Start Bit

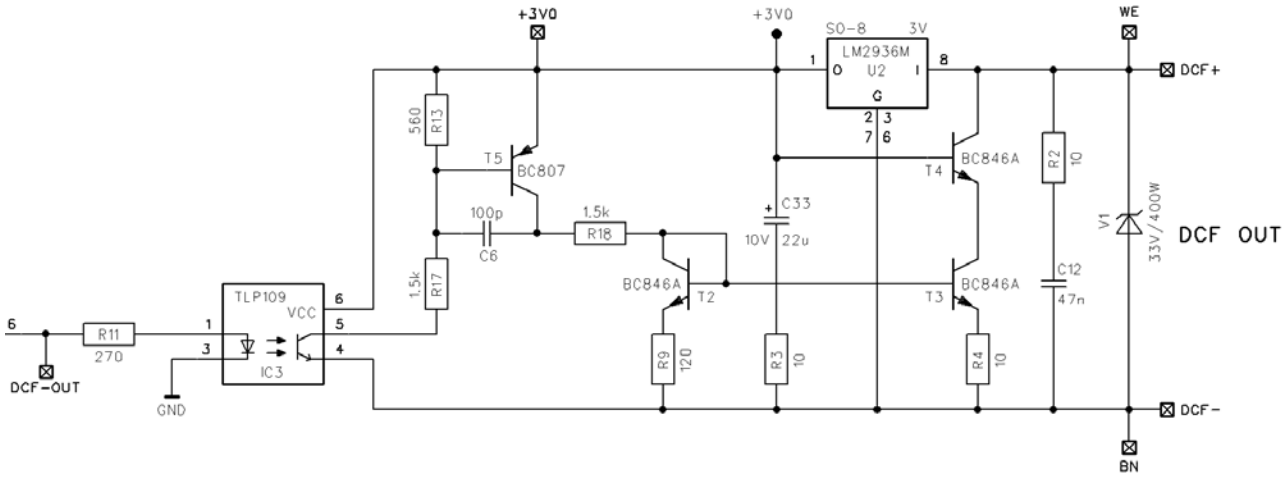
P1: Parity Bit Minute
P2: Parity Bit Hour
P3: Parity Bit Date

Time Information (coding: BCD):
Coordinated Universal Time (UTC) or
Central European Time (CET)

Time Frame:
1 minute, 1 bit/second

Output Circuit

The “+DCF out” and “-DCF out” signals can be connected directly to master clocks, such as mobatime’s ETC or DTS devices. Use the information given in the following figure to check compatibility with other manufacturer’s products.



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HEADQUARTERS / PRODUCTION

MOSER-BAER AG
Spitalstrasse 7, CH-3454 Sumiswald
Tel. +41 34 432 46 46 / Fax +41 34 432 46 99
moserbaer@mobatime.com / www.mobatime.com

SALES WORLDWIDE

MOSER-BAER SA EXPORT DIVISION
19 ch. du Champ-des-Filles, CH-1228 Plan-les-Ouates
Tel. +41 22 884 96 11 / Fax + 41 22 884 96 90
export@mobatime.com / www.mobatime.com

SALES SWITZERLAND

MOBATIME AG
Stettbachstrasse 5, CH-8600 Dübendorf
Tel. +41 44 802 75 75 / Fax +41 44 802 75 65
info-d@mobatime.ch / www.mobatime.ch

MOBATIME SA
En Budron H 20, CH-1052 Le Mont-sur-Lausanne
Tél. +41 21 654 33 50 / Fax +41 21 654 33 69
info-f@mobatime.ch / www.mobatime.ch

SALES GERMANY, AUSTRIA

BÜRK MOBATIME GmbH
Postfach 3760, D-78026 VS-Schwenningen
Steinkirchring 46, D-78056 VS-Schwenningen
Tel. +49 7720 8535 0 / Fax +49 7720 8535 11
buerk@buerk-mobatime.de / www.buerk-mobatime.de