Preface

The GPS2000 Wireless Receiver can be directly connected to the current SICLOCK central clocks SICLOCK TC400 and SICLOCK TC100 without connecting the GPS1000 PS (Power Supply). This also applies to the connection to the older and discontinued model SICLOCK TS.

If connected to these central clocks, the power supply for the GPS2000 Wireless Receiver is provided by the SICLOCK TC400/TC100 or the SICLOCK TS.

If you connect the GPS2000 Wireless Receiver to the older and discontinued model SICLOCK TM, the GPS1000 PS is required for the power supply.

If you were to use the GPS2000 as a stand-alone solution that is directly connected to a PC or an S7, the GPS1000 PS is also required as the power source.

1. Quick-Start Guide

1.1. Function

The SICLOCK GPS2000 Wireless Receiver is a modern GPS radio-controlled clock which can be used worldwide for the reception of time signals from the 24 American GPS satellites. A DCF77 time message frame is available at the output of the wireless receiver. This is formed from UTC (Coordinated Universal Time).

The particular advantage of the GPS2000 Wireless Receiver is that the antenna, GPS receiver and GPS decoder are integrated in the device as one unit and there is therefore no need to lay coaxial cables, nor to separately install the decoder together with a power supply.

Both the power supply of the wireless receiver and also the transmission of the DCF77 time message frame is via line current by means of a shielded twin-core control cable with a maximum length of approx. 1000 meters. The power supply module (e.g. SICLOCK GPS1000 PS) is at the opposite end of the control cable. The receiver is thus supplied with power from this module. In the case of the SICLOCK GPS1000 PS, you have to supply the power supply module itself with 24 – 230 V AC/DC, with a SICLOCK TC400/TC100/TS with 24 V DC.

The SICLOCK GPS2000 Wireless Receiver does not require parameters to be assigned.

1.2. Scope of Delivery

The GPS2000 Wireless Receiver is supplied with lightning protection as operation is only permitted with lightning protection. The scope of delivery varies depending on the GPS2000 Wireless Receiver package. The following packages are available:

SICLOCK GPS2000 GPS Wireless Receiver package with lightning protection 2XV9450-1AR84-0AA0
Comprising
- GPS2000 Wireless Receiver 2XV9450-1AR88-0AA0 with integrated electronics and 2.5m connecting cable with end splices
- Lightning protection module 2XV9450-1AR83

Antenna holding frame for universal mounting 2XV9450-1AR03
Comprising:
- antenna stand with base plate and holding arm,
- cube with 6 hexagonal socket set screws
- Sealing cap
- Allen key for installing the cube

SICLOCK GPS2000 GPS with GPS1000 PS package 2XV9450-1AR82-0AA0
Comprising
- SICLOCK GPS2000 GPS Wireless Receiver package with lightning protection
- SICLOCK GPS1000 PS (Power Supply) 2XV9450-1AR85-0AA2
- Antenna holding frame for universal mounting
- Conduit box for connecting the control cable
- Connecting cable to PC COM port (9-pin D-sub)
- Instruction Manual on CD (German/English)

SICLOCK GPS2000 GPS with TC400 2XV9450-2AR10-0AA0
Comprising
- SICLOCK GPS2000 GPS Wireless Receiver package with lightning protection
- SICLOCK TC400 2XV9450-2AR01
- Antenna holding frame for universal mounting
- Conduit box for connecting the control cable
- Instruction Manual on CD (German/English)

SICLOCK GPS2000 GPS with TC100 **2XV9450-2AR50-0AA0**

Comprising

- SICLOCK GPS2000 GPS Wireless Receiver package with lightning protection
- SICLOCK TC100 2XV9450-2AR22
- Antenna holding frame for universal mounting
- Conduit box for connecting the control cable
- Instruction Manual on CD (German/English)

SICLOCK GPS2000 GPS with 20m connecting cable **2XV9450-2AR82-0AB0**

Comprising

- GPS2000 Wireless Receiver 2XV9450-1AR88-0AB0 with integrated electronics and 20m connecting cable with wire end ferrules
- Lightning protection
- Antenna holding frame for universal mounting
- Conduit box for connecting the control cable
- Connecting cable to PC COM port (9-pin D-sub)
- Instruction Manual on CD (German/English)

1.3. Installation Procedure

1. Look for a suitable location for the wireless receiver, taking the following into account:
   Install the wireless receiver in such a way that it should be able to "see" as much sky as possible. It must be installed with the housing cover pointing upwards, parallel to the sky.
   Do not install the wireless receiver in places where there is lightning hazard! (See Chapter3)
   Make sure that there is easy access for service. (Electromagnetic interference fields from the plant do not need to be taken into account as the operating frequency of GPS2000 is above the industrial interference level.)
2. Mark the drill holes for installing the antenna stand in accordance with Figure 9 before drilling and inserting dowels.
3. Make the bore hole for the connecting cable, preferably in the middle underneath the base plate.
4. Assemble the wireless receiver on the antenna frame in accordance with Figure 7 or Figure 8.
5. Thread the cable into the bore hole and screw on the stand. For mounting on flat roofs, use an additional IP67 conduit box and an additional control cable to extend if necessary. Important: Total length max. 1000m
6. Inside the building, install the lightning protection module 2XV9450-1AR83 supplied near the cable entry, If required, install the surface-mounted conduit box supplied.
7. With a system to be synchronized (PC, SICLOCK TM, S7 or similar), mount the power supply module GPS1000 PS on a DIN rail, for example. If the system to be synchronized is a SICLOCK TC400/TC100 or SICLOCK TS, a GPS1000 PS power supply unit is not required.
8. Lay a shielded control cable from the GPS1000 PS power supply module (terminal strip X2/11,12) or the SICLOCK TC400/TC/TS to the lightning protection module (terminal strips 1' and 2', i.e. the output side). Now connect the input side (terminal strips 1 and 2) of the lightning protection module to the antenna connecting cable of the wireless receiver (polarity is not important in this case).
9. Attach the shielding of the control cable to the equipotential busbar in the control cabinet.
10. You have the following options for setting up synchronization to your plant:
    Connection to a PC: via the cable supplied for X3 at SICLOCK GPS1000 PS to a free COM port. (Driver software required: 2XV9450-1AR28). In addition, supply the GPS1000 PS via the connections to the terminal strip X1/13, 14, 15.
    Connection to SICLOCK TM: Using a shielded twin-core control cable (e.g. LiYCY 2x 1 mm^2) from the terminal strip X2/1,2 at SICLOCK GPS1000 PS to the SICLOCK TM, terminal strip X2/5, 6. In addition, supply the GPS1000 PS via the connections to terminal strip X1/13, 14, 15.
    Connection to SICLOCK TC400, TC100 and TS: Using a shielded twin-core control cable (e.g. LiYCY 2x 1 mm^2) directly from the wireless receiver (the GPS1000 PS is not required) to the SICLOCK TC400/TC100 terminal strip X2/8, 9 OR X2/10/11 or to the SICLOCK TS terminal strip X2/9,10.
    Connection to SIMATIC S7 digital input: Using a shielded twin-core control cable (e.g. LiYCY 2x 1 mm2) from the terminal strip X2/3, 4 of the SICLOCK GPS1000 PS to the corresponding SIMATIC S7 digital input. (The required function block for the Step7 software for the SIMATIC Manager and the TIA_Portal can be found on the Operating Instructions CD). In addition, supply the GPS1000 PS via the connections to the terminal strip X1/13, 14, 15.
11. Switch on the mains power of the SICLOCK GPS1000 PS or the SICLOCK TC400/TC/TS.
12. Setting the parameters for the PC driver software or the SICLOCK TC400/TC100/TM/TS or the S7 should be undertaken in accordance with operating specifications for the plant.

1.4. Operation and Maintenance

In the case of operation of a SICLOCK GPS1000 PS

After successful installation, the mains voltage can be directly switched on at the SICLOCK GPS1000 PS. The green "Pwr." LED lights up. Initialization of the wireless receiver starts (yellow LED "Sig." is constantly lit). After successful initialization processing of the time message frames begins. Depending on the reception quality and number of satellites received, this process is usually completed after 30 minutes (in as little as 15 minutes with good conditions). In this phase the wireless receiver sends a “heartbeat” in the form of 50ms pulses in 2-second intervals (indicated by the green LED).

The start of normal operation, with permanent radio reception is indicated by the transition of “heartbeat” pulses on DCF77 message frames (with UTC) If the yellow LEDs do not light up or flash at all, this indicates a device defect or a breakage of the antenna cable.

Normal operation then starts. The SICLOCK1000 PS now constantly makes DCF77 message frames with UTC available. The second pulses of these message frames are indicated by the brief non-appearance of the LED "Sig." at the GPS1000PS. The DCF77 message frames are constantly available in parallel at the outputs “TTY/20mA” and “TTY inv.” at the terminal strip X2 as active TTY/20 mA signals and at the SUB-D jack X3 as an RS232 signal.

The SICLOCK GPS2000 wireless receiver operates maintenance-free.

If you have not installed alarm signaling for recognizing a malfunction of radio synchronization of the connected system in the plant, then checks should be made at regular intervals that the yellow LED “Sig.” on the GPS1000 PS power supply module is still flashing (at one-second intervals).

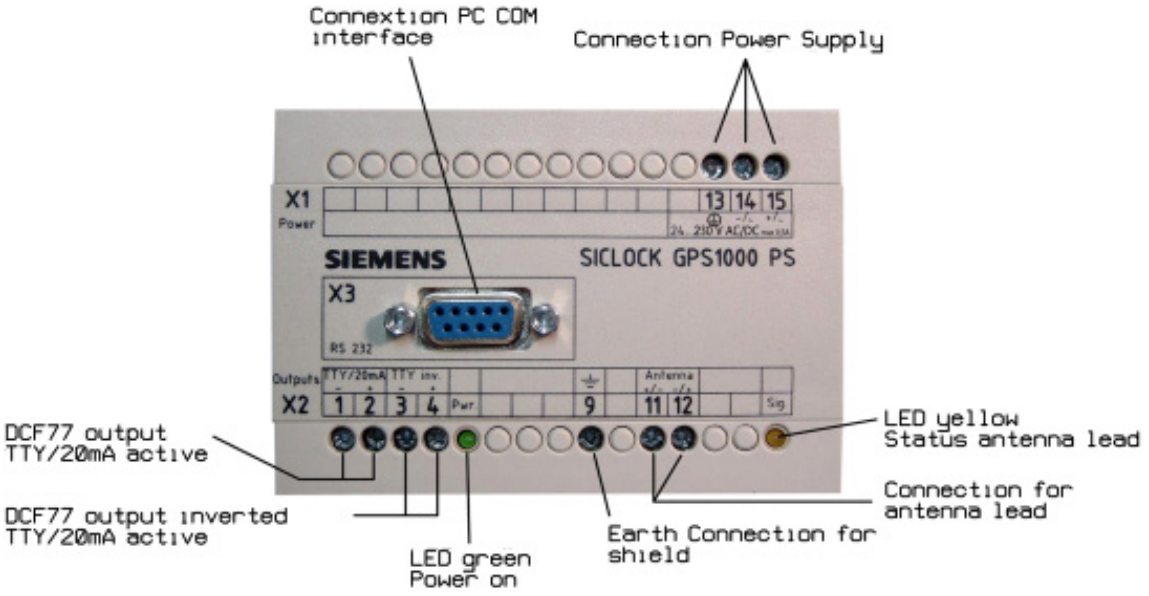

Figure 1: Front view of GPS1000 PS

Direct operation at a SICLOCK TC400/TC100/TS

After the power supply of the SICLOCK TC400/TC100/TS has been applied the receiver unit integrated in the wireless receiver searches for available GPS satellites and initializes time reception. Depending on the number of receivable satellites, this process takes between 15 and 30 minutes. In the case of an unfavorable reception location for the antenna or wireless receiver, it may also take longer than 30 minutes until the required number of satellites is received. The initialization process therefore takes longer. During the initialization process the SICLOCK GPS2000 sends the heartbeat signal.

Normal operation then starts. The SICLOCK2000 now constantly makes DCF77 message frames available with UTC.

The SICLOCK GPS2000 wireless receiver operates maintenance-free.