

# TSC100

## USER MANUAL



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## 1 Introduction

The TSC100 – Tekron’s powerful and cost effective GNSS synchronization solution for Remote Terminal Units (RTUs), Protection Relays and other Intelligent Electronic Devices (IEDs) used in electrical sub-stations and industrial control installations.

Utilizing state of the art technology, this compact unit locks onto atomic clock references from the GNSS satellite constellation and produces time codes and pulses with sub-microsecond accuracy and precision.

The TSC100 clips onto a standard DIN rail or can be used free standing. Its rugged design is suitable for noisy electrical environments, while built in electrical isolation combined with strong push pull drives on all outputs simplify wiring schemes and enhance reliability.

It comes complete with Ethernet cables to allow for customization and easy setup from the Windows™ Configuration software which is available to download from [www.tekron.com](http://www.tekron.com). Optional accessories include antenna, low loss antenna cable, antenna pipe mounting components, and lightning protection kit.



## 2 LED Indicators

The top of the TSC100 features three LED indicators: PWR, SYN and ALM. Refer to the table below for a description of their meanings.

1. The PWR LED shows the power status of the unit.
2. The SYN LED shows the synchronized status of the unit.
3. The ALM LED shows the alarm status of the unit. Refer to the Configuration Tool for an indication of what alarm is present.

LED	LED Status	Meaning
PWR	OFF	No power is being supplied to the unit.
	ON	Power is being supplied to the unit.
SYN	OFF	No power.
	Slow (2 Hz) flash	Unit is in holdover.
	Fast (4 Hz) flash	Unit is out of synchronized.
	ON	Unit is synchronized.
ALM	OFF	No alarms present.
	Flashing	Alarm present (holdover, out of sync, antenna failure, etc.)

### 3 Inputs and Outputs



Figure 1: Top view of TSC100

#### Antenna connector (ANT)

The “ANT” antenna input provides an interface for an external active antenna via low-loss coaxial cable. It is recommended that cable with 50  $\Omega$  impedance is used. The TCS100 supplies 5 Vdc, 50 mA to power an active antenna. The total combined gain of the antenna system (antenna plus cable and connectors) should fall in the range of 10 to 35 dB, the optimum being 22 dB.

A Lightning Protection device should be inserted into the antenna lead. A suitable device complete with additional cable connectors, a connector crimping tool and mounting hardware is available as an option. Use of a Lightning Protector does not degrade the performance of the antenna system.

#### Alarm connector (N NO NC)

The alarm port is a 3 pin, 5.08 mm type connector. The alarm port is a high voltage port with a normally open (NO) and a normally closed (NC) contact, they are labelled on your unit appropriately. Both contacts are rated at 300 V, 100 mA AC or DC. The port is galvanically isolated from the internal electronics and protected by high voltage, self-resetting fuses and transient suppressor diodes for safety.

The Alarm port is designed to switch a load which will limit the current supplied.

The Alarm can be triggered from multiple sources which can be programmed via the Configuration Tool software.

#### TTL connectors (P1/P2)

The two TTL outputs, labelled P1 and P2, are high drive ports capable of driving 150 mA @ 4.5 V. They can be driven by a user programmable pulse, IRIG-B or DCF-77. Each port has its own transient protection. Both ports are galvanically isolated from the internal electronics although they are not isolated from each other.



Figure 2: Bottom view of TSC100

### **Power Supply connector (PWR)**

The TSC100 power port is a 2 pin screw lock (5.08 mm pitch). The power supply is a ultra-wide range DC power supply capable of operating over 48 V to 250 V DC drawing a maximum of 5 W.

### **USB connector (USB)**

TSC100 units are fitted with a USB type B port, which allows the unit to be configured. By turning off configuration over Ethernet, configuration can only be performed via USB, which can prevent unauthorized tampering with the unit.

### **Ethernet Port (ETH)**

TSC100 units are fitted with a RJ45 Ethernet interface port, which allows the unit to be configured over a LAN (Local Area Network) switch or by direct connection. The TSC100 can be ordered with, or upgraded to output NTP/SNTP and/or PTP via the Ethernet interface. The interface supports 10 and 100 Mbps connectivity.

## 4 Installation

### Identification

Each TSC100 unit is shipped with an identification label on the side of the case. The label provides details of the power supply requirement, the serial number and firmware revision.

### Mounting the TSC100

The clock is designed to be mounted to a standard din rail mount using the supplied clips on the base (See figure 3).



Figure 3 - Base of the TSC100

### Earthing

The unit must be earthed via the earthing terminal next to the power input connector. The cable cross section must be equal or greater than  $0.75 \text{ mm}^2$  (18 AWG).

### Connection and Synchronization

Connect the antenna lead and the antenna (with a good view of the sky).

Connect the power source to the power input terminals on the base of the unit. The power connection is polarity sensitive.

Once the unit is powered, you can configure the unit (if desired); by connecting a PC to the TSC100 with either an Ethernet cable (RJ45) or a USB cable (Type B). Use the Configuration Tool to configure your TSC100.

The time required to acquire the GNSS satellites and obtain tracking and synchronization (given a good view of the sky) is typically within a minute. Reactivating a unit that previously has been synchronized previously, will take longer, but not more than 45 minutes.

The TSC100 is now set up, and you can connect the outputs and alarms as required.

If you require further support, are encountering difficulties or the unit is not functioning as expected, please contact [support@tekron.com](mailto:support@tekron.com).



The label on the side of TSC100 contains the voltage rating: Do not apply power outside of this rating

## 5 Appendix

### TSC100 Specifications

Physical Specifications			
1.6 mm Steel DIN rail enclosure with IP30 (Ingress Protection rating).			
Performance Property		Metric	
Dimensions	Width	110 mm	
	Depth	45 mm	
	Height	155 mm	
Weight		0.42 kg	
GNSS Receiver			
L1/GLONASS (1575.42 / 1598 MHz) Frequency, C/A Code, 32 Channel, parallel-tracking receiver			
Performance Property		Metric	
Sensitivity	Acquisition	-155 dBm	
	Tracking	-160 dBm	
Input and Output Specifications			
Type	Electrical	Physical	Accuracy at the port
TTL	5 V (4.5 V @ 150 mA)	BNC	≤ 100 ns of UTC
Antenna Input	5V	BNC	
Alarm	300 V, 100 mA	3 pin 5.08 mm	
USB	3.3 V	USB type B	
Ethernet		RJ45	
NTP/SNTP		RJ45	≤ 100 ns of UTC
PTP		RJ45	≤ 100 ns of UTC
Environmental Specifications			
Performance Property		Metric	
Operating Temperature Range		-40 to +65 °C	
Electrical Specifications			
Performance Property		Metric	
Power Supply		48 Vdc - 250 Vdc	
Power drain		5 W max	

## 6 Warranty

For terms and conditions of Tekron's Warrantee see the Web Site  
<http://tekron.com/about-tekron/warranty>



### WARNING

This product has been designed to comply with the limits for a Class A digital device pursuant to Part 15 of FCC rules. These limits are designed to provide reasonable protection against such interference when operating in a commercial environment.

### Notes

The information in this manual may change without notice. The manufacturer assumes no responsibility for any errors that may appear in this manual.

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