

## TTM 01-G

### Compact Substation Clock

The TTM 01-G is a reliable and accurate GPS and GLONASS clock with sub-microsecond timing, ideally suited for synchronizing Intelligent Electronic Devices (IEDs) in the power industry and other industries where precise and reliable timing is required.

As with all Tekron clocks, the TTM 01-G has electrically isolated outputs providing an extra layer of protection to all connected IEDs.

#### Key Features

- Supports GPS and GLONASS
- Independently isolated outputs
- Isolated power supply
- High power line drivers
- Low noise characteristics due to balanced pair distribution
- UTC and LST with user defined DST options
- Remote configuration
- Configuration Security

#### Supports

- DC IRIG-B (Un-modulated, DCLS)
- AM IRIG-B (Modulated)
- Serial Strings
- User defined pulses
- Modified Manchester
- NTP / SNTP (IEC 61850)
- PTPv2 (IEEE 1588-2008)
- DCF77
- Fibre output option



## Physical

- UL94-V0 polycarbonate flame retardant DIN-rail mount case with IP40 (Ingress Protection rating).
- (W) 72 mm x (D) 60 mm x (H) 90 mm, 0.2 Kg
- Rising clamp terminals: Wire size (max): 1.5 mm  $\varnothing$

## LED Indicators

- Sync Status
- Antenna/cable fault
- Satellite acquisition mode

## Environment and Electrical

Power supply: L = 14 - 36 Vdc  
M = 20 - 75 Vdc  
H = 90 - 300 Vdc

Power Drain: 4 W max

Operating temperature:  
-10 to +65°C

Humidity: To 95%  
non-condensing

## Isolation

Power to  
Antenna: 1 kV  
Power to I/O: 1.6 kV (LV)  
1.6 kV (MV)  
3.75kV (HV)



\*Some optional features may incur extra costs

## Standard Outputs

### TTL

1 x TTL programmable output, 2-pin, 0-5 V, 150 mA

### Fibre

1 x Fibre programmable output, 62.5/125  $\mu\text{m}$ ,  $\lambda$  820 nm, compatible with multi-mode fibre

## Additional Outputs

In addition to the standard output, one of the following output options are also available for the TTM 01-G

### TTL

1 x TTL programmable output, 2-pin, 0-5 V, 150 mA

### Or AM IRIG-B

1 x AM IRIG-B output, 2-pin, 9 Vpp, 120  $\Omega$

### Or Serial Strings

1 x RS232 level serial strings output

### Alarm Output

1 x Sync relay (2 pin - Form A contact)  
Contact rating: 275 V, 100 mA AC or DC

## Ethernet Output

- 1 x RJ-45 10/100 Ethernet UTP connector
- Or 1 x ST multi-mode fibre Ethernet available

### Protocols Supported:

ARP, UDP, ICMP, TFTP, DHCP, SNMP v1, v2c, v3

### General

DHCP auto-configuration with fallback to ARP tested link-local address  
VLAN packet tagging

### NTP\*

Stratum-1 NTP and SNTP time server, Multicast and Broadcast server capability, Optional MD5 authentication  
Timing accuracy: <100 ns to UTC

### SNMP

- v1, v2c, and v3 support can be independently enabled
- Configurable v1, v2c community names and security groups
- Fully configurable via SNMP
- v3 User-based Security Module (USM) supports
  - USM authentication methods: MD5, SHA
  - USM privacy methods: DES, AES

- USM MIB support

## GNSS Receiver

L1, C/A code, 32 Channel Parallel-tracking receiver

- Frequency:
  - GPS L1 C/A 1575.42 MHz
  - GLONASS L1 1598 - 1606 MHz
- Constellation: GPS + GLONASS
- Sensitivity:
  - Acquisition: -148 dBm
  - Tracking: -160 dBm
  - Antenna Supply: 5 Vdc up to 100 mA
  - Antenna Impedance: 50 Ω

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## Oscillator – TCXO

Holdover characteristics operating at 25 degrees C:

- TCXO 1PPS drifts 0.55 ms over a 24 hour period.
- Drift rate: 7 ppb per second

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## Optional Accessories

- GNSS antenna
- Antenna cable
- Adjustable antenna mount
- Lightning protection kit

Refer to [tekron.com](http://tekron.com) for full technical specifications.

### About Tekron

Tekron is a leading developer of accurate GPS/GLONASS clocks and time synchronisation solutions for use in industrial applications.

## Contact Us

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## Ethernet Output Continued

### Notifications

- SNMP trap generation v1, v2c, and v3
- SNMPv3 traps can be authenticated and privatised via USM
- Syslog (RFC-3164 and 5424 varieties)

### IEEE 1588-2008 (PTPv2) Support\*

As per Ethernet Output section plus: -

- PTPv2 (IEEE 1588-2008) operation
- Grandmaster (GNSS) or ordinary clock functions
- Profile selection:
  - Default Profile (E2E and P2P)
  - IEEE C37.238 Power Profile (2011 and 2017)
  - IEC 61850-9-3 Power Utility Profile
  - ITU-T G.8265.1 Telecom Profile (Slave only)
  - ITU-T G.8275.1 Telecom Profile (Full support)
- One-step / Two-step Operating Modes
- Layer 2 or Layer 3 mapping
- Peer to Peer, End to End and Fixed delay support
- Typical timing accuracy (single sub-net) <100 ns

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## Configuration Software

Windows based configuration software is available to be downloaded from the Tekron website. Remote configuration over Ethernet includes the following user adjustable features:

- Multi-level access control
- Privacy and authentication methods equivalent to SNMP USM
- “Supervisor-mode” prevents non-approved changes
- Test mode
- Commissioning tool

### Timing and Synchronization

Daylight and local time configuration can be set using either rule based or fixed date methods. Test mode allows equipment checks to be made prior to full installation, and an adjustable holdover period provides resiliency against GNSS dropouts. Adjustable fields allow for compensation of delays such as the antenna cable delay of GNSS signals.

### Programmable Outputs

- IRIG-B (B00x / B22x) time code with selectable C37.118.1 and AFNOR S87-500 extensions
- DCF77 time code 1 kHz square wave
- User defined pulse sequences:
  - Repetition rates from 20 ms to 24 hours
  - Offsets and durations from 10 ms to 24 hours
  - Resolution is 10 ms; timing accuracy is 100 ns

### Serial Strings

- NMEA-0183 ZDA
- NMEA-0183 RMC
- NGTS

\*Some optional features may incur extra costs



- IRIG J-17
- Tekron A - H (8 protocols for easy interoperability).