



## MC-1-U GPS Master Clock

Accurate. Reliable. Compact.

Masibus MC-1-U GPS Master Clock has been developed to address key power and process industry time synchronization requirements. It is the most featured and cost-effective GPS time synchronization solution for versatile applications like monitoring, control or analysis of the power system in compact 1U Rack mount size. MC-1-U provides time synchronization accuracy better than 1 microsecond.

MC-1-U generates wide range of timing signals via seven programmable different output ports. It has various outputs like RS232 serial ports, PPS Port, IRIG-B ports, RJ45 ports and relay outputs. These outputs have ample drive capability to easily drive multiple loads in parallel and its parameter fully configurable. The GPS Backup battery is now included in MC-1-U. This feature improves acquisition time to as little as 15 seconds after a brief power loss by supplying constant power to the real-time clock.

MC-1-U has a front panel display and keypad providing comfort for installation and usage. LEDs provide at-a-glance status information. MC-1-U has facility to program the parameters by local PC connection via serial port. Configurations includes time zone correction, hour setting, serial data format selection and is password protected to avoid unauthorized access. MC-1-U supports IP Gateway & Subset mask configurable via Ethernet port through Telnet. It is also individually programmable if more Ethernet Outputs are available.

### Features

- Reliable and cost effective
- 8 time-formats over 7 output ports
- 12 Satellite parallel tracking
- Universal (AC/DC) Power Supply
- Highly accurate TCXO type crystal (OCXO Optional)
- 2x20 Character backlit LCD display
- Remote configuration using TELNET
- Supports synchronization of IEC61850 compliant devices via NTP/SNTP protocol
- Programmable Pulse Output
- Solid State relays for fast pulse response
- All weather water proof antenna
- Synchronization software for Server & Client
- Supporting Protocols:
  - NMEA-0183 (RMC)
  - NGTS & T-FORMAT
  - IRIG-B Modulated
  - IRIG-B TTL
  - SNTP/NTP (RJ45 ports)

### Applications

- Sequence of event recorders
- Disturbance recorders
- Numerical relays
- UNIX, Linux & Windows servers
- Slave clocks
- PLC/DCS/SCADA
- ABT metering
- EMS system
- Telecommunication
- Synchrophasor measurement
- Fault locator

# Technical Specifications

## GPS Receiver

Timing Accuracy	< 10 ns with GPS Receiver (Receiver is locked on fixed position)
Positioning Accuracy	< 10 m
Input Frequency	1575.42 MHZ L1 C/A code
Tracking	12 parallel channels
Acquisition time	Hot Start < 5 sec Warm Start < 38 sec Cold Start < 45 sec

## Antenna

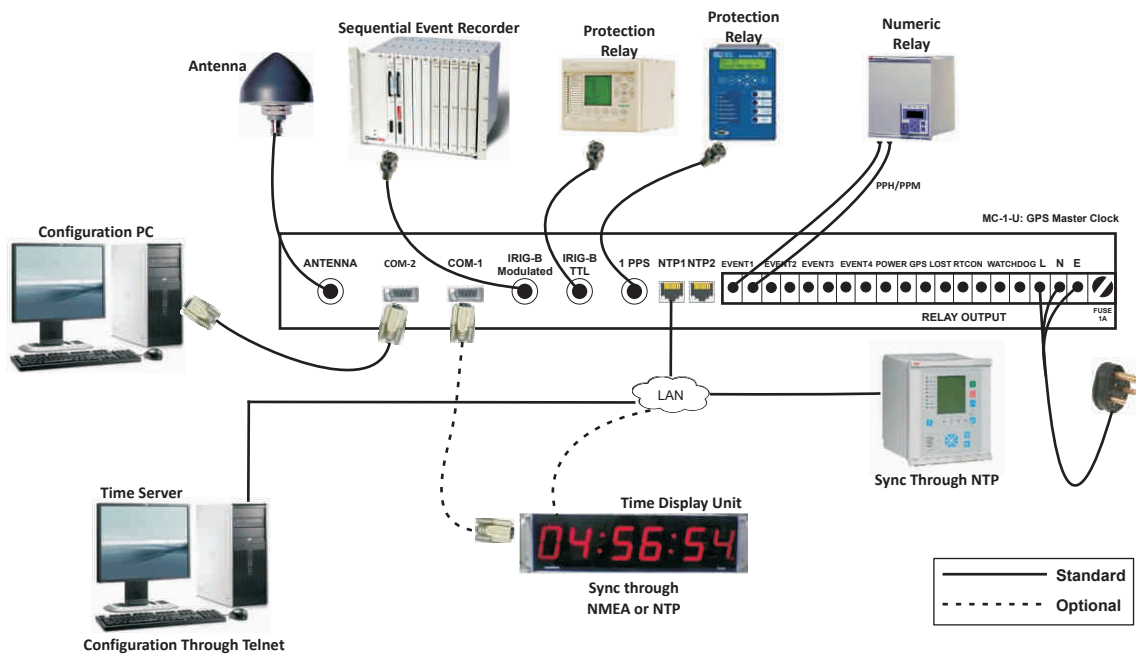
Type	Active L1. GPS, 30 dB gain
Antenna Cable	RG 6(Std) / RG 8 (Optional coaxial cable)
Operating Temperature	-40 to +85 °C
Coverage	360 °C
Ingress Protection	IP67
Weight	150 g

## Interface and Configuration

Display	2x20 Character backlit LCD Display
Displayed data	<ul style="list-style-type: none"> <li>Local / UTC time and date</li> <li>Day of the week</li> <li>Position latitude, longitude</li> <li>Status of the GPS receiver</li> <li>Current data format of COM2</li> </ul>
Status LEDs	Power, 1PPS, Watchdog, Event, GPS Locked
Configuration Programming	Parameters programmable by <ul style="list-style-type: none"> <li>Keypad</li> <li>Hyper Terminal (Serial RS232)</li> <li>Ethernet Parameters using TELNET (Ethernet RJ45 Port)</li> </ul>
Programmable Parameters	<ul style="list-style-type: none"> <li>Global time zone correction</li> <li>Hour settings for Display (12 or 24 Hrs)</li> <li>Data format selection (NGTS or T-FORMAT)</li> <li>Repetitive event generation output via Potential free Contact (Per Minute or Hour)</li> <li>Additional Event Configuration (Total &amp; On time of Events)</li> <li>Manual Time setting</li> <li>Propagation delay correction (compensate for antenna cable length)</li> </ul>
Configurable Parameters via TELNET	IP, Gateway and Subnet
NTP / SNTP Client Software	<ul style="list-style-type: none"> <li>Platform Support: Windows 98/NT/2000/XP/7 server synchronization</li> <li>NTP Client Software is for easy distribution of time across the network</li> </ul>



# Application



# Technical Specifications

## Time Signal Output

Output	Description	Physical Interface	Accuracy GPS Locked	Available Output (Std)
1PPS	<ul style="list-style-type: none"> <li>1 Pulse per second</li> <li>TTL into 250Ω</li> <li>200 ms Pulse Width</li> </ul>	BNC Female connector	±300 nSec	1
IRIG-B Modulated	<ul style="list-style-type: none"> <li>Format: IRIG-B(127)</li> <li>1 KHz AM Signal</li> <li>Modulation Ratio: 3:1</li> <li>3 to 10Vp-p, into 50Ω ±10%</li> </ul>	BNC Female connector	±60 μSec	1
IRIG-B TTL	<ul style="list-style-type: none"> <li>Format: IRIG-B (007)</li> <li>TTL into 50Ω</li> </ul>	BNC Female connector	±60 μSec	1
NTP (LAN Interface)	<ul style="list-style-type: none"> <li>Protocol Support: NTP V3, SNTP, SNMP V2</li> <li>Network Protocol: TCP, Telnet, UDP, IPv4</li> <li>Mode: Server</li> <li>Network Interface: RJ45, 10/100Mbps</li> </ul>	RJ45	±1 mSec	Standard: 1 Optional: 1
COM-1 NMEA-0183 (RMC)	<ul style="list-style-type: none"> <li>Isolated Serial RS232 /485**</li> <li>Fix configuration :9600-8-N-1</li> </ul>	DB9 Female Connector	-	1
COM-2 (NGTS & T-Format)	<ul style="list-style-type: none"> <li>Isolated Serial RS232/485**</li> <li>Programmable baud rate, stop bit, parity bit and message format</li> <li>Selectable between NGTS &amp; T-Format</li> </ul>	DB9 Female Connector	-	1

\*\*RS232/485 is site selectable default setting from Factory is RS232

## Event and Alarm Output

Output	Description
Standard Event Output (1 Nos.)	<ul style="list-style-type: none"> <li>Selectable between 1PPM/1PPH</li> </ul>
Optional Event Output (4 Nos.)	<ul style="list-style-type: none"> <li>Configurable time period 1Sec to 24Hrs.</li> <li>Programmable ON time <b>50 milliseconds (min.) to 50% (max.)</b> of particular event time period</li> <li>All four o/p are individual programmable</li> <li>Voltage rating: 350 V DC level, 150mA</li> </ul>
Alarms (3 Nos.)	<p>All Isolated Potential free contacts: AC: 230 V/ 10A, DC: 30/110/220 V DC, 10/0.3/0.12 A (max)</p> <p>a) GPS Sync. Lost, b) Watchdog, c) Power Fail</p>

# Technical Specifications

## Power Supply

Power Supply (Std)	AC: 90-264V, 47 to 63 Hz DC: 125-340V
Power Supply (Optional)*	DC: 18-72V (Optional on Request)
Power Consumption	< 15 W
Compliance	Meets EN61204-3 Class B and CISPR/FCC Class B

### Isolation (Withstanding voltage)

Between primary terminals\* and secondary terminals\*\*: **At least 1500 V AC for 1 minute**  
Between primary terminals\* and grounding terminal: **At least 1500 V AC for 1 minute**  
Between grounding terminal and secondary terminals\*\*: **At least 1500 V AC for 1 minute**  
Between secondary terminals\*\*: **At least 500 V AC for 1 minute**

\* Primary terminals indicate power terminals and relay output terminals.

\*\* Secondary terminals indicate Output Ports.

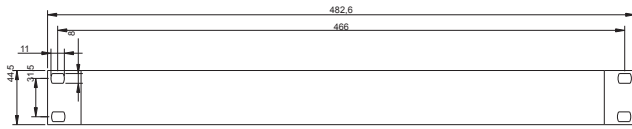
**Insulation resistance:** 20MΩ or more @ 500 V DC between power terminals and grounding terminal.

**Note:** No Isolation between IRIGB-TTL and PPS Output.

## Physical

Mounting	1U, 19" Rack Mount
Dimensions (mm) H x W x D	45 x 483 x 324
Ingress protection	IP20 enclosure
Weight	3 Kg (approx)

## Panel Cut-out



GPS-1U FRONT VIEW

### 1U GPS MASTER CLOCK CUTOOUT DIMENSION DETAIL

WIDTH: 466MM  
HEIGHT: 45MM  
HOLE CENTER TO CENTER : 466MM

## Environmental

Operating temperature	0 to +55 °C
Storage temperature	-20 to +80 °C
Humidity	20-90% Non Condensing

## Type test

Electrostatic Discharge (ESD)	IEC 6100-4-2
Radiated Susceptibility	IEC 6100-4-3
EFT Test	IEC 6100-4-4
Surge Test	IEC 6100-4-5
Conducted Susceptibility (Conducted RF)	IEC 6100-4-6
Power Frequency Magnetic Field	IEC 6100-4-8
High Frequency Disturbance	IEC 6100-4-10
Voltage interruption/voltage dips	IEC 6100-4-11
Damped Oscillator Magnetic Field	IEC 6100-4-12
Radiated Emission Conducted Emission	As per CISPR-22
Vibration	IEC 68-2-6
Bump Test	IS 9002 Part-7
Dry Heat Test	IEC 60068-2-2
Damp Heat Steady State test	IEC 60068-2-30
Shock Test	IEC 60255-21-2
Dielectric Test	
Cold Test	IEC 60068-2-1: 2007

Accuracy Test Report from NPL Delhi is also available

## Standard Output Available

Output	No
1PPS	1
Event (1PPM/1PPH)	1
IRIGB, TTL	1
IRIG-B Modulated	1
COM-1 (NMEA)	1
COM-2 (NGTS/T- Format)	1

## Accessories (Optional-On Request)

Surge Suppressor / Lighting Arrestor
Signal Amplifier
RS232/485 Repeater
TDR-4 (Time Distribution rack)
TSR-4 (Time Signal Repeater)
Netser (NGTS-NTP) Converter
TDU-64 (Time / Date / Day / Frequency Display)

## Ordering Code

Model	LAN Output		Event Output		Antenna Cable Length	
MC-1-U	X		X		X	
	0	None	0	None	1	15 Meter
	1	One	1	4 Event O/P	2	30 Meter
	2	Two			3	50 Meter
					4	100 Meter
					5	150 Meter
					S	Special

X - Specify from table

\* Contact Factory for Power Supply changes except standard

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### Masibus Representative: