8030HEPTA-02/GPS

Network time server for rack mounting

The FG8030HEPTA-02/GPS is a network time server system that features precise and reliable time synchronization at highly competitive pricing for business critical applications in the automation industry.

The 8030 product series time reference systems have been designed to flexibly support the wide variety of time synchronization standards in the automation industry as a highly cost-efficient system solution with featuring a modular ordering concept.

The network time server FG8030HEPTA-02/GPS is ideal for everyone searching for a space-saving and budget-friendly solution with numerous configuration and extension options. Up to four additional isolated and mutually independent network time server modules FG8030NTS-02/M may be integrated into the base system ensuring enhanced security and availability in redundant networks.

The system is available with wide range power supply for AC input voltage 85 – 264VAC (50Hz / 60Hz) or with power supply for DC input voltages 24VDC (18 – 36VDC), 48VDC (36 – 76VDC) and 110VDC (100 – 250VDC). The DC voltage power supply versions feature redundant power inputs for connection of two power sources for enhanced availability.

A variety of extension modules is available for time signal output:
- Network time synchronization using Network Time Protocol (NTP), SIMATIC NET SINEC H1 Time Datagram or IEEE 1588™-2019 Precision Time Protocol (PTP)
- IRIG-B signal output (demodulated / modulated)
- DCF77 signal output (demodulated / modulated)
- Programmable cyclic pulse (PPS, PPM, PPH)
- Serial time datagram (e. g. *hopf* Standard, IEC-103, ABB Melody / Freelance, Trimble TSIP, SAT1703 / SICAM RTU)
- Signal distribution via electrical or fiber-optic signal output

The 8030 product series time synchronization modules feature on receiver and firmware level consistency checks and statistical tests such as automatic gain control (AGC), clock error, signal quality, signal power, propagation delay and the angle of arrival in order to safeguard error free and leap free time signal evaluation.

In case of signal loss due to antenna failure or identification of time signal mismatch (e.g. due to jamming or spoofing attacks) the time synchronization module clock automatically switches to the integrated oscillator holdover ensuring the oscillator dependent freewheeling accuracy.

Interfaces

- 2x Ethernet 10/100/1000 Mbit/s autosensing via RJ45
- 1x USB-Port for update and recovery function
- 1x optical coupler for synchronization status output
- **Optional:** additional signal output modules
  - * additional independent NTP time servers can be integrated
  - * IRIG-B (modulated / demodulated)
  - * DCF77 pulse
  - * Cyclic Pulses
  - * Serial Time Datagram

Networking Features

- Tagged VLANs according to IEEE 802.1Q
- Port aggregation / Bonding / NIC teaming of LAN port ETH0 and ETH1 with support of IEEE 802.3ad
- Configuration of static routing table
- Parallel Redundancy Protocol (PRP) according to IEC 62439-3 for use as Dual Attached Node (DAN) - **optional**
- Precise Time Protocol (PTP) according to IEEE 1588-2019 - **optional**

System Monitoring / Alarming

- SNMPv3, SNMP Traps (MIB II, Private Enterprise MIB)
- E-mail notification
- Syslog messages to external Syslog Server

Time Protocols

- NTPv4.2.x Server
- NTP Broadcast
- NTP Multicast mode
- SNTP Server
- SINEC H1 time datagram – **optional**
- RFC-867 DAYTIME Server
- RFC-868 TIME Server
- Precise Time Protocol (PTP) according to IEEE 1588-2019 – **optional**
  - IEEE C37.238-2011
  - IEEE C37.238-2017
  - IEC 61850-9-3:2016

RFC Listing of Supported Protocols

- NTPv4 - Protocol and Algorithms Specification (RFC 5905)
- NTPv4 - Autokey Specification (RFC 5906)
- PPS API (RFC 2783)
- DHCP (RFC 2131)
- Time Protocol (RFC 868)
- Daytime Protocol (RFC 867)
- HTTP (RFC 2616)
- HTTPS (RFC 2818)
- SSH-2 (RFC 4250-4256, 4335, 4344, 4345, 4419, 4432, 4716, 5656)
- TELNET (RFC 854)
- SNMP (RFC 1213, RFC1901-1908)
- SYSLOG (RFC 5424)
- SMTP (RFC 5321)

Customized system modifications are available upon request!

Technical Data.

General Data	
Housing:	sheet steel /aluminium, closed
Dimensions:	19" 1U/84HP – depth 230mm
Protection class:	IP20
Cooling:	passive, ventilation slots left/right
Weight:	approx. 3.0kg
Input Voltage (standard delivery):	85-264VAC (50/60Hz)
Optional:	100-250VDC, with redundant power feeding 24VDC (18-36VDC), with redundant power feeding 48VDC (36-76VDC), with redundant power feeding
Temperature range: Operation:	0°C to +70°C
Temperature range: Storage:	-20°C to +75°C
Humidity:	max. 95%, non condensing
MTBF:	> 200,000h
Operating Altitude	up to 2,000m above sea level according to IEC 61850-3

Ethernet Ports – ETH0/ETH1	
Network connection:	via LAN cable with RJ45 connector, male (recommended cable type CAT5 or better)
Request per second:	max. 10,000 requests (for 1000Mbit connections)
Number of connectable clients:	theoretically unlimited
Network interface:	2x 10/100/1000 Mbit/s autosensing (included base system), max. 8 additional 10/100/1000 Mbit/s ports possible via LAN modules 8030NTS-02/M
Ethernet compability:	version 2.0 / IEEE 802.3
Isolation voltage (network-to system-side):	1500 Vrms

Boot time:	typical: 35 seconds
	- When using static IP addresses for ETH0 and ETH1.
	  Depending on the network configuration in use (e.g. DHCP) an extension of
	  the boot phase can occur.

GPS Data (module 8024)	
Receiver type:	22-channel phase tracking GPS receiver, C/A code
Evaluation:	GPS L1 frequency (1,575.42MHz)
Sensitivity:	Tracking: -161dBm Cold Start: -148dBm
Synchronization time TTF (Time to First Fix):	• Hot start: 1 s • Cold start: < 1 min • First initialization: < 12.5 min (without valid leap second information)

Antenna connection:	• Via BNC connector, female
	• For active antennas,
	  Ub = 5VDC / max. 70mA
	• Antenna power feed via BNC connector,
	  female of module 8024

Accuracy	
Internal PPS pulse on GPS reception (after 5min. GPS reception):	<u>Standard crystal:</u> < ± 30ns <u>VCTCXO crystal:</u> < ± 15ns
VCO control of the internal quartz base:	<u>Standard crystal:</u> < ±0.030ppm <u>VCTCXO crystal:</u> < ±0.015ppm

Freewheel accuracy:	<u>Standard crystal:</u>
	< ± 0.1ppm after at least 5min. GPS reception / T = +20°C
	Drift for T = +20°C (constant):
	- after 1h: 0.36msec.
	- after 24h: 8.64msec.
	
	<u>VCTCXO crystal:</u>
	< ± 0.02ppm after at least 5min. GPS reception / T = +20°C
	  Drift for T = +20°C (constant):
	  - after 1h: 0.072msec.
	  - after 24h: 1.73msec.

Internal back-up clock (RTC):	±25ppm / for T = +10°C to +50°C (constant)
Electrical outputs - optional	
Demodulated IRIG-B B00x/cyclic pulse/DCF77 pulse	5V/5V TTL -max. 200mA per output 24V - max.40mA per output
Modulated IRIG-B B12x	approx. 2.8Vpp / 5.6Vpp at 50 Ohm
Fiber optical outputs - optional	
Demodulated IRIG-B B00x/cyclic pulse/DCF77 pulse	FO multimode -wave length 820nm -design: F-ST

List of applicable European Standards

EN 55032:2012/AC:2013	Electromagnetic compatibility of multimedia equipment - Emission Requirements (150kHz – 30 MHz class B)
EN 61000-4-2:2009	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test
EN 61000-4-4:2013	Electromagnetic compatibility (EMC) - Part 4-4:Testing and measurement techniques - Electrical fast transient/burst immunity test
EN 61000-4-5:2014/A1:2017	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
EN 61000-4-6:2014	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-6-2:2005/AC:2005	Electromagnetic compatibility (EMC). Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-3:2007/A1:2011/ AC:2012	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments
EN 62368-1:2014/AC:2015	Audio/video, information and communication technology equipment - Part 1: Safety requirements
EN 301 489-1 V2.1.1 (2017-02)	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services - Part 1: Common technical requirements - Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU

EN 301 489-19 V2.1.0 (2017-03)	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services - Part 19: Specific conditions for Receive Only Mobile Earth Stations (ROMES) operating in the 1,5 GHz band providing data communications and GNSS receivers operating in the RNSS band (ROGNSS) providing positioning, navigation and timing data - Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU
EN 303 413 V1.1.1 (2017-06)	Satellite Earth Stations and Systems (SES) - Global Navigation Satellite System (GNSS) receivers - Radio equipment operating in the 1164 MHz to 1300 MHz and 1559 MHz to 1610 MHz frequency bands - Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

Statement of Compliance with RoHS Directive

Directive 2011/65/EU of the European parliament and of the council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS 2) including commission delegated directive (EU) 2015/863 of 31 March 2015 (RoHS 3)

All products manufactured by the company hopf comply with the requirements for the restriction of the use of certain hazardous substances according to the Directive.