The Synchronization Experts.

Compact Design and High-Performance for Broadcast Applications

Meinberg's microSync HR is a powerful dual-port PTP generator supporting SMPTE ST 2059-2 and many other PTP profiles, all within a compact, space-efficient half-rack design. It offers a high level of efficiency and flexibility and can be deployed in a large range of different industries and applications. This innovative, multipurpose synchronization solution offers a variety of outstanding features, many of which are also found in Meinberg's IMS and LANTIME product families.

Key features include two PTP ports, two Management/NTP ports, and Black Burst, LTC, Word Clock and PPS input. This product combines a modern sync reference for IP based devices and a Signal Pulse Generator for legacy video and audio devices and is a perfect solution for smaller broadcast environments like OB vans or remote production use cases.

The microSync HR is not only suitable as a high-performance NTP server, but it can also be used as a highly accurate PTP grandmaster. The unit can be managed using the Meinberg Device Manager software which is available for Windows and Linux platforms.

In addition to the preconfigured inputs and outputs, the microSync can be ordered with different GNSS receivers and oscillators options.

Product Highlights

- Powerful IEEE 1588 Time Server
- Full SMPTE ST 2059-2 Support
- Space-Efficient Solution for smaller Broadcast Environments
- Multiple GNSS Receiver Options Available
- Different Oscillator Options for Advanced Holdover Performance
- Meinberg Device Manager for Configuration and Status Monitoring
- Three-year Manufacturer's Warranty
- Unlimited Technical Support Including Firmware Updates

Tabel of Contents

Connectors 3

LAN Network Interfaces 3
COM 0 Timestring 3
Status Indicators CPU 3
Status Indicators Receiver 3
USB Terminal 4
USB Host 4
PPS In (Pulse Per Second Input) 4
CLK In (Word Clock Input) 4
Status Indicators Input 4
Black In (Black Burst Input) 4
Black Out (Black Burst Output) 4
DARS Out 4
Word CLK Out (Word Clock Output) 5
Status Indicators Video Sync Generator (VSG) 5
PP 1 Out & PP 2 Out (Programmable Pulse Outputs) 5
LTC / GPIO (Linear Time Code / General Purpose I/O) 5

Power Supply 6

Configuration Options 6

Receiver Options 6
Oscillator Options 6

Performance Level Options 6

Software Specifications 7

Protocols & Profiles 7
Management 7
- User Management 7
- Firmware Management 7
- Meinberg Device Manager 7
- Self-Diagnosis 7

Jamming and Spoofing Detection 8

Anti-Jamming Technology 8
Anti-Spoofing Technology 8

Multiple Reference Sources 8

Intelligent Reference Selection Algorithm 8

Scope of Delivery 9

Desktop AC Adapter 9
Optional Expansions – SFP Modules 9

Technical Specifications 10

Physical Dimensions 10
Mechanical Data 10

Environmental Requirements 10

Type Tests 11

Safety Tests 11
Environmental Tests 11
Electromagnetic Compatibility – Immunity 11
Electromagnetic Compatibility – Emission 12

Compliance 12

Model / Ordering Code 12

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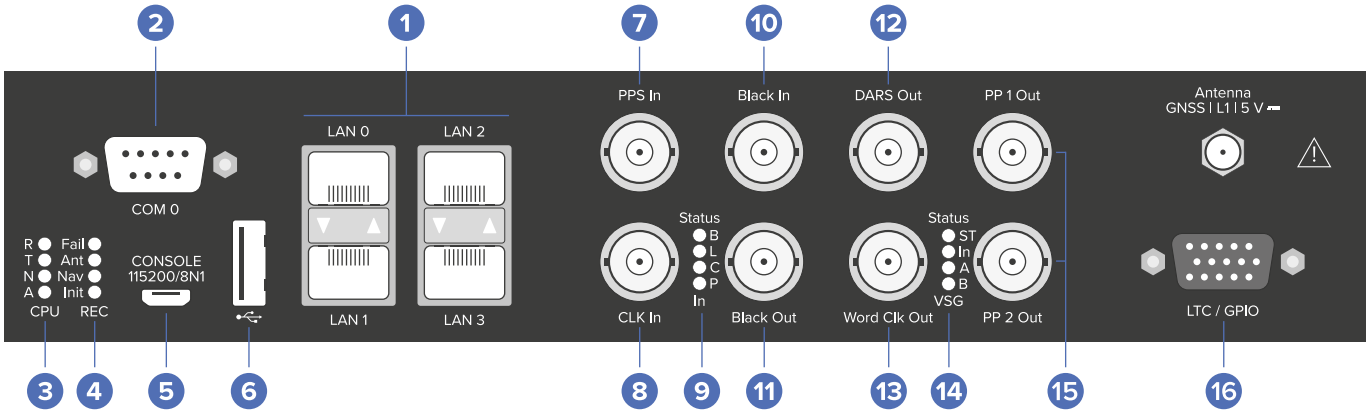
Connectors 70x Series



1 LAN Network Interfaces

SIGNAL TYPE	LAN 0, 1	LAN 2, 3	ACCURACY	CONNECTION TYPE
Gigabit Ethernet (GbE), 10/100/1000 Mbit	Management / NTP 10/100/1000 Mbit, RJ45 or 1000FX	Management / NTP 10/100/1000 Mbit, RJ45 or 1000FX, LAN 2: PTP Master & Slave LAN 3: PTP Slave Synchronous Ethernet: ▪ Master and Slave Capability ▪ Compliant to ITU-T G.8261, G.8262 and G.8264 ▪ Ethernet Synchronization Messaging Channel (ESMC)	▪ NTP: ≤100 µs ▪ PTP: ≤20 ns	SFP

2 COM 0 Timestring

SIGNAL OUTPUT	ASSIGNMENT	CONNECTION TYPE
RS-232	▪ Pin 2: RxD (Receive) ▪ Pin 3: TxD (Transmit) ▪ Pin 5: GND (Ground)	9 pin D-SUB, male

3 Status Indicators CPU

R (RECEIVER)	T (TIME SERVICE)	N (NETWORK)	A (ALARM)
▪ **Blue:** Initialisation phase ▪ **Green:** The reference clock provides a valid time ▪ **Red:** The reference clock does not provide a valid time	▪ **Green:** NTP is synchronized to the reference clock, e.g. GNS ▪ **Red:** NTP is not synchronized or switched to the “local clock”	▪ **Green:** All monitored network interfaces are connected ▪ **Red:** At least one of the monitored network interfaces is faulty	▪ **Off:** No error ▪ **Red:** General error

4 Status Indicators Receiver

FAIL	ANT	NAV	INIT
▪ **Red:** No synchronization	▪ **Green:** Antenna connected and clock is synchronized ▪ **Red:** No synchronization resp. no antenna connected or short circuit on the antenna line	▪ **Green:** Positioning complete	▪ **Blue:** Initialisation phase ▪ **Green:** “Warmed up” - oscillator is adjusted

5 USB Terminal

SIGNAL TYPE	CONNECTION TYPE
USB-to-serial console	Micro-USB Type B

6 USB Host

SIGNAL TYPE	CONNECTION TYPE
USB connector management CPU	USB Type A

7 PPS In (Pulse Per Second Input)

SIGNAL INPUT	SIGNAL LEVEL	PULSE LENGTH	CONNECTION TYPE
Pulse Per Second	TTL	≥5µs, active high	BNC, female

8 CLK In (Word Clock Input)

SIGNAL INPUT	SIGNAL LEVEL	SIGNAL RANGE	CONNECTION TYPE
Word Clock Input with programmable frequency range	TTL	1 kHz to 10 MHz	BNC, female

9 Status Indicators Input

B	L	C	P
Status of Blackburst Input	Status of LTC Input	Status of Word Clock Input	Status of PPS Input

10 Black In (Black Burst Input)

SIGNAL INPUT	SIGNAL LEVEL	TIME CODE FORMATS	CONNECTION TYPE
Black Burst (PAL) Input with VITC Reader **Input with Prescaler mode (Frequency only)**	300 mV_{pp} into 75 Ω unbalanced	PAL SMPTE ST 259M / ITU-R BT.470-6 SMPTE ST 12M-1 / SMPTE ST 309M	BNC, female

11 Black Out (Black Burst Output)

SIGNAL OUTPUT	SIGNAL LEVEL	FORMATS	CONNECTION TYPE
PAL, NTSC Black Burst with VITC Support	300 mV_{pp} into 75 Ω unbalanced	**Black Burst:** PAL (SMPTE ST 259M / ITU-R BT.470-6) NTSC (SMPTE ST 170M / ITU-R BT.470-7) VITC (SMPTE ST 12M-1 / SMPTE ST 309M) **Tri-Level Sync:** 720p 50 Hz (SMPTE ST 296M3) 1080i 25 Hz (SMPTE ST 274M6) 720p 59,94 Hz (SMPTE ST 296M1) 1080i 29,97 Hz (SMPTE ST 274M7)	BNC, female

12 DARS Out

SIGNAL OUTPUT	SIGNAL LEVEL	SIGNAL TYPE	CONNECTION TYPE
DARS	TTL, 2.5 V into 75 Ω	Base Frequencies: 44.1 kHz and 48 kHz	BNC, female

13 Word CLK Out (Word Clock Output)

SIGNAL OUTPUT	SIGNAL LEVEL	BASE FREQUENCIES	CONNECTION TYPE
Word Clock	TTL, 2.5 V into 75 Ω	**Base Frequency 44.1 kHz:** Scales: 1/32, 1/16, 1/8, 1/4, 1/2 , 1, 2, 4, 8, 16, 32 Frequency Range: 1.378125 kHz - 1.4112 MHz **Base Frequency 48 kHz:** Scales: 1/32, 1/16, 1/8, 1/4, 1/2 , 1, 2, 4, 8, 16, 32 Frequency Range: 1.5 kHz - 1.536 MHz	BNC, female

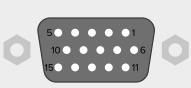
14 Status Indicators Video Sync Generator (VSG)

ST	IN	A	B
St: Status of internal VSG	Synchronization status	Status of Black Burst output	Status of LTC output

15 PP 1 Out & PP 2 Out (Programmable Pulse Outputs)

SIGNAL OUTPUT	SIGNAL LEVEL	ACCURACY	CONNECTION TYPE
Programmable Pulse	TTL into 50 Ω	▪ Pulse Per Second ▪ Pulse Per Minute ▪ Pulse Per Hour ▪ Cyclic Pulse ▪ Single Shot ▪ Timer ▪ Idle ▪ All Sync ▪ Time Sync ▪ Position OK ▪ DCF77 Marks ▪ Time Code DCLS ▪ Serial Time String ▪ Synthesizer Frequency ▪ PTTI 1PPS	BNC, female

16 LTC / GPIO (Linear Time Code / General Purpose I/O)

SIGNAL INPUT/OUTPUT	SIGNAL LEVEL	PIN ASSIGNMENT	CONNECTION TYPE
Linear Time Code (25 fps)	TTL, > 2.5 V_{pp} into 50 Ω (Pin 14 + 15)	1 LTC_out + LTC symmetric HI Pot. Output 2 LTC out - LTC symmetric Lo Pot. Output 3 LTC_in + LTC symmetric HI Pot. Input 4 LTC in - LTC symmetric Lo Pot. Input 5 LTC in, TTL level, Input 6 GND 7 GND 8 GND 9 GND 10 GND 11 DARS + DARS symmetric Hi Pot. Output 12 DARS - DARS symmetric Lo Pot. Output 13 NC (not connected) 14 TIME_SYN TS output, TTL Level 15 LTC TTL out LTC output, TTL Level 	15 pin D-SUB, female

Power Supply

TYPE	NOMINAL VOLTAGE RANGE (U_N)	MAXIMUM VOLTAGE RANGE (U_{MAX})	MAXIMUM POWER CONSUMPTION (P_{MAX})
DC	12–24 V DC	10–36 V DC	30 W

Configuration Options

Receiver Options

RECEIVER TYPE	SIGNAL TYPE	SUPPLY VOLTAGE	CONNECTION TYPE
GNS: L1 Multi-GNSS (GPS, GLONASS, Galileo, BeiDou), 72-Channel	L1/E1/B1 band	5 V DC	SMA
GPS: Meinberg GPS, 12-Channel	IF (Meinberg Antenna)	15 V DC	BNC
GNS-UC: Meinberg Multi-GNSS (GPS, Galileo), 72-Channel	IF (Meinberg Antenna)	15 V DC	BNC

Oscillator Options

TYPE	HOLDOVER PERFORMANCE (1 DAY)	HOLDOVER PERFORMANCE (1 YEAR)
OCXO SQ	±220 µs	±4.7 s
OCXO MQ	±65 µs	±1.6 s
OCXO HQ	±22 µs	±788 ms
OCXO DHQ	±4.5 µs	±158 ms

For detailed oscillator specifications, please visit: www.mbg.link/osc

Performance Level Options

PERFORMANCE LEVEL	UNICAST CLIENTS	DELAY REQ./S IN MULTICAST / HYBRID MODE
PL-A	8	1024
PL-B	256	32768
PL-C	512	65536

Software Specifications

Protocols & Profiles

NETWORK PROTOCOLS	IEEE 1588 PROFILES
▪ IPv4, IPv6	▪ IEEE 1588v2 Default Profile
▪ NTPv3, NTPv4, SNTP	▪ IEEE C37.238-2011 Power Profile
▪ PTPv2	▪ IEEE C37.238-2017 Power Profile
▪ IEC 62439-3 (PRP)	▪ IEC/IEEE 61850-9-3 Power Utility Profile
▪ DHCP, DHCPv6	▪ Enterprise Profile
▪ DSCP	▪ ITU-T G.8265.1, ITU-T G.8275.1, ITU-T G.8275.2 Telecom Profiles
▪ IEEE 802.1q VLAN filtering/tagging	▪ SMPTE ST 2059-2 Broadcast Profile
▪ IEEE 802.1p QOS	▪ IEEE 802.1AS TSN/AVB Profile
▪ SNMPv1/v2/v3	▪ AES67 Media Profile
▪ Remote Syslog Support (UDP)	▪ DOCSIS 3.1

Management

User Management

The user management allows to create, manage and delete individual users. Thereby, each user can be given, or withdrawn individual write and read access for all configuration options, as well as read-only rights for status displays. Furthermore, users can be deactivated or added for a limited time. Password changes are also possible, as well as the option of periodically prompting the user to renew its password.

In addition, there are three available predefined role templates (admin, info, status) included that offer the user a preselection of access levels. Based on this, individual rights can be added or deleted. Moreover, management protocols like SNMP, Shell or mbgdevman can be enabled for each user account to limit access to the device.

Firmware Management

The integrated firmware management of meinbergOS allows to install multiple firmware versions in parallel and choose which one to run. All integrated components and modules (e.g. the GPS receiver part) can be updated with the latest firmware if required.

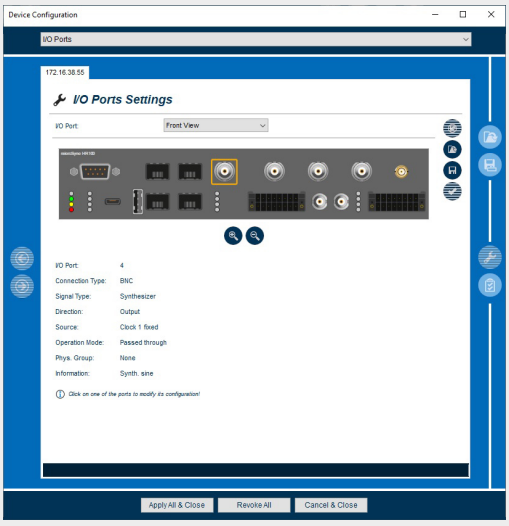
Meinberg Device Manager

The Meinberg Device Manager utility is a graphical desktop application that allows to configure Meinberg Devices over an encrypted network connection or a local USB or serial connection. A great advantage of the Meinberg Device Manager is that various devices can be configured and monitored simultaneously.

The Meinberg Device Manager for Windows can be used under Windows 7 and all newer versions. Supported Linux distributions include Ubuntu, Mint Linux, Debian, SUSE Linux, CentOS, and others.

The software is delivered on the USB stick included in the scope of delivery and does not have to be installed or copied on the PC. The Meinberg Device Manager can be started directly from the USB data carrier. The computer must be connected to the network in which the microSync system is connected.

Otherwise the software is available for download on our website:
www.meinbergglobal.com/english/sw/mbg-devman.htm



Meinberg Device Manager - Configuration Interface

Self-Diagnosis

The system continuously carries out background checks of various parameters such as system resources, port and receiver states. The user is notified when an incident occurs.

Jamming and Spoofing Detection

Our GNSS receivers GNS181 and GNS181-UC are able to receive multiple GNSS constellations in parallel. The GNS181-UC can receive GPS and Galileo signals whereas the GNS181 can additionally receive GLONASS and Beidou signals. These receiver types have implemented Jamming and Spoofing Detection technologies.

Anti-Jamming Technology

The detection of jamming attacks are based on active CW (continuous wave) interference detection and an on-board SAW band pass filter. In case a jamming event occurs where the GNSS satellites cannot be received anymore, the microSync will switch either seamlessly to the next available source in its priority list (e.g. IRIG-B or PTP) or falls back to its internal high quality OCXO which is available at different grades.

Anti-Spoofing Technology

Spoofing is a process whereby a malicious third party tries to control the reported position via a “fake” GNSS broadcast signal. This may result in the form of reporting incorrect position, velocity or time. To combat against this, the receiver module includes spoofing detection measures to alert the system when signals appear to be suspicious.

The receiver combines a number of checks on the received signals looking for inconsistencies across several parameters. The spoofing detection feature monitors suspicious changes in the GNSS signal indicating external manipulation. The detection is successful when the signal is genuine first and when a transition to the spoofed signal is being observed. The algorithms rely on availability of signals from multiple GNSS constellations.

In case a spoofing attack is detected, the microSync system is notified by the receiver. The microSync system is then in a position to either switch to a different source or run on internal OCXO (available in firmware 2020.08.0 or higher).

Multiple Reference Sources

The microSync system is able to handle input signals of Multiple Reference Sources (MRS) simultanously.

The following input signals can be used in a user-configurable order:

- GNSS
- Serial Time String + PPS
- PPS (depending on model)
- 10 MHz (depending on model)
- PTP
- NTP (firmware V2020.08.0 and higher)

In case the signal which has the highest priority is lost, the system will switch to the next available source.

Intelligent Reference Selection Algorithm

In case that a master signal fails the Intelligent Reference Selection Algorithm (IRSA) takes care that the switching to the next reference signal in the priority list runs automatically and smoothly.

If the next selectable source has an offset that is <10 µs compared to the previous one the system will slowly adjust to this offset without causing a phase jump. If the offset is larger than 10µs, the system will set the time immediately.

In the event that the original source comes back, the system will again use that source for synchronization.

The IRSA also takes the highly stable holdover performance of the local oscillator into account. It ensures that switching from the superior reference signal to the less accurate one is delayed as long as the highly stable oscillator can provide better accuracy in holdover than the next available reference signal in the priority list.

Scope of Delivery

QUANTITY	ITEM
1x	microSync HR (incl. Mounting Brackets [1])
1x	Antenna, L1 Multi-GNSS / Meinberg GPS Antenna/Converter Unit [2]
1x	Antenna Cable, 20 m (65.62 ft), SMA / BNC connector [2]
1x	Antenna Mounting Kit [2]
1x	Desktop AC Adapter (see specifications below)

[1] *In order to withstand the environmental tests for vibration, shock and seismic, special mounting brackets are optionally available*

[2] *Depending on selected receiver*

Desktop AC Adapter

SPECIFICATIONS	
Connector	Outer Ø 5.5 mm, Inner Ø 2.5 mm, Pin Length 10.5 mm
Cable	1800 mm (70.87 inch)
INPUT	
Maximum Voltage Range (U_{max})	90-264 V AC
Frequency	47-63 Hz
Input Current	max. 1.2 A
Inrush Current	Cold start @ 25 °C 100 A, max. @ 240 V AC
OUTPUT	
Output Voltage	24 V
Output Current	2.1 A

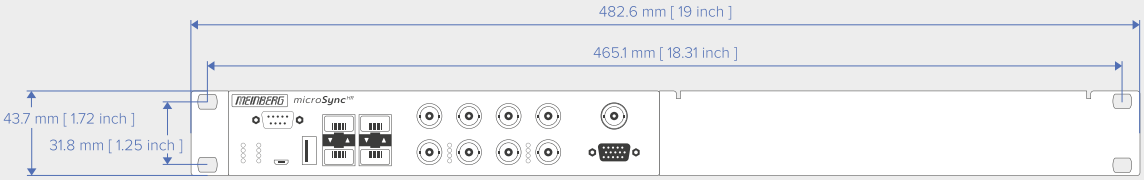
Optional Expansions – SFP Modules

Recommended and tested transceivers from other vendors which are available at additional costs.

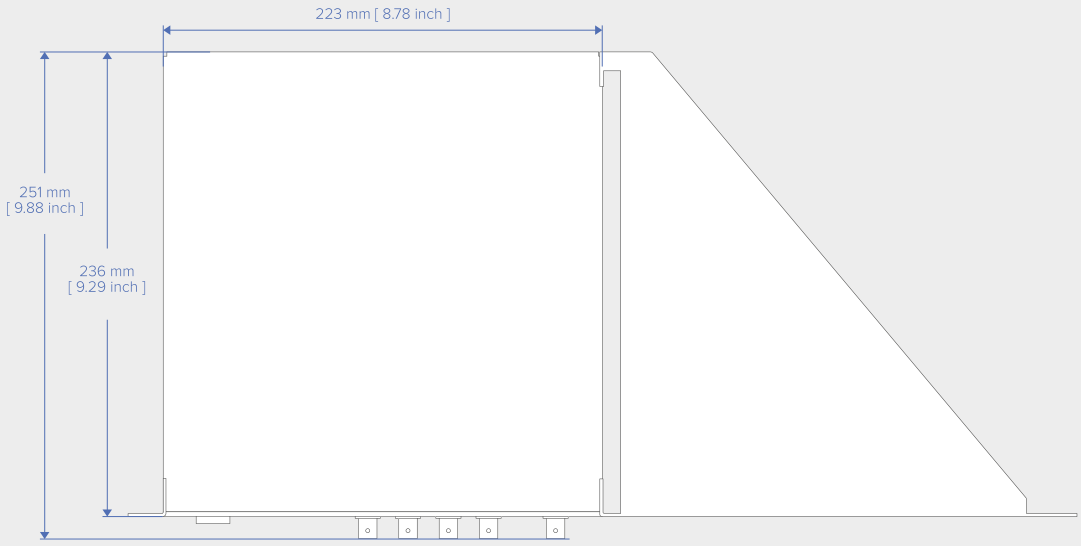
RJ-45 (TRIPLE SPEED 10/100/1000 BASE-T)	SINGLE MODE (1000BASE-LX, 10KM, LC SFP, 1310 NM)	MULTI MODE (1000BASE-SX, LC SFP, 850 NM)
AVAGO ABCU-5740RZ	**AVAGO** AFCT-5710PZ	**AVAGO** AFBR-5710PZ
FINISAR FCLF8521P2BTL	**FINISAR** FTLF1318P3BTL	**FINISAR** FTLF8524P3BNL

Technical Specifications

Physical Dimensions



Front view with mounting brackets



Top view with mounting brackets

Mechanical Data

Housing Type	9.5" (Half-Rack), 1U
Housing Material	Steel
Weight (incl. Mounting Brackets)	2.2 kg (4.85 lbs)

Environmental Requirements

Recommendations for continuous operation.

Operating Temperature Range	0 to 50 °C (32 to 122 °F)
Storage Temperature Range	–20 to 70 °C (–4 to 158 °F)
Relative Humidity	5 to 95 % (non-condensing) at 40 °C (104 °F)
Operating Altitude	up to 4,000 m (13,123 ft) above sea level
Atmospheric Pressure	615 to 1600 hPa

Type Tests

Safety Tests

IEC 62368-1 Safety Requirements	Overvoltage Category	II
	Protection Class	1
	Degree of Pollution	2
IEC 60529	Protection Rating / IP Code	IP30

Environmental Tests

IEC 60068-2-1	Cold	-5 °C (23 °F), 16 h
IEC 60068-2-2	Dry heat	55 °C (131 °F), 16 h
IEC 60068-2-14	Change of temperature	-5 to 55 °C (23 to 131 °F), 5 cycles, 1 °C (34 °F)/min
IEC 60068-2-30	Damp heat, cyclic (12 h + 12 h)	55 °C (131 °F), 97 % RH, 6 cycles
IEC 60068-2-78	Damp heat, steady state	40 °C (104 °F), 93 % RH, 240 h
IEC 60255-21-1	Vibration (sinusoidal) [1] Class 1	10–150 Hz, 0.5 g_n, 2 sweeps, 3 axes 10–150 Hz, 1 g_n, 40 sweeps, 3 axes
IEC 60255-21-2	Shock [1] Class 1	5 g_n, 11 ms, ±3 shocks, 3 axes 15 g_n, 11 ms, ±3 shocks, 3 axes 10 g_n, 16 ms, ±1000 shocks, 3 axes
IEC 60255-21-3	Seismic [1, 2] Class 1	4-35 Hz, 0.5 g_n, 1 sweep, hor. axes 4-35 Hz, 1 g_n, 1 sweep, ver. axis

[1] In order to withstand the tests for vibration, shock and seismic, special mounting brackets are optionally available.
[2] The frequency range deviates from the values required by the standard. In this test, a frequency range of 4-35 Hz instead of 1-35 Hz was used.

Electromagnetic Compatibility – Immunity

IEC 61000-4-2	Immunity test to electrostatic discharges	±4 kV contact discharge ±8 kV air discharge
IEC 61000-4-3	Immunity test to radiated, radio-frequency, electromagnetic fields	10 V/m, 80-1000 MHz, 80% AM (1 kHz) 3 V/m, 1400-2700 MHz, 80% AM (1 kHz)
IEC 61000-4-4	Immunity test to electrical fast transients (Burst)	±2 kV, DC main lines ±1 kV, Signal lines
IEC 61000-4-5	Immunity test to surges	DC main lines: up to ±0.5 kV line to line up to ±0.5 kV line to earth Signal lines: up to ±1 kV line to earth
IEC 61000-4-6	Immunity test to conducted disturbances, induced by radio-frequency fields	10 V, 0.15-80 MHz, 80% AM (1 kHz)
IEC 61000-4-8	Immunity test to power frequency magnetic fields	30 A/m
IEC 61000-4-29	Immunity test to voltage dips, short interruptions and voltage variations	ΔU 30 % for 100 ms ΔU 60 % for 100 ms ΔU 100 % for 50 ms

Electromagnetic Compatibility – Emission

CISPR 16-1-2 and CISPR 16-2-1	Conducted disturbance voltage measurements
CISPR 16-2-3	Radiated radio disturbance
CISPR 32	Conducted disturbance current measurements
FCC 47 CFR Part 15 section 15.107 (b) [3] RSS-Gen Issue 4 section 8.8 [4]	Conducted emission
FCC 47 CFR Part 15 section 15.109 (b) [3] RSS-Gen Issue 4 section 8.9 [4]	Radiated emission
ETSI EN 303 413	Standard for GNSS receiver

Compliance

CB Scheme	✓	**CSA**	✓
CE	✓	**WEEE**	✓
FCC	✓	**RoHS**	✓
UL	✓	**REACH**	✓

Model / Ordering Code

MICROSYNC AA112BB(B)	MODEL CODE DECONSTRUCTED				DESCRIPTION / KEY FEATURES / SPECIFICATIONS
	AA	11	2	BB(B)	
Form Factor	HR				9.5” Half-Rack, 1U
Series		70			Configuration as described under “Connectors”
Receiver Options			0		GNS: L1 Multi-GNSS, 72-Channel
			1		GPS: Meinberg GPS, 12-Channel
			2		GNS-UC: Meinberg Multi-GNSS, 72-Channel
Oscillator Options				SQ	OCXO SQ
				MQ	OCXO MQ
				HQ	OCXO HQ
				DHQ	OCXO DHQ
Power Supply					U_N: 12–24 V DC U_{max}: 10–36 V DC